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FOOD AND ATTITUDE AS HAZARDS TO SWIMMING

by



ERIC HOWARD ABELL

A THESIS

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The undersigned certify that they have read,  
and recommend to the Faculty of Graduate Studies for  
acceptance, a thesis entitled "Food and Attitude as  
Hazards to Swimming" submitted by Eric Howard Abell  
in partial fulfilment of the requirements for the  
degree of Master of Arts.



## ABSTRACT

The purpose of this study was to ascertain the effect that eating and attitude have on a swim of a recreational nature. Particular attention was paid to the subject's perception of comfort and discomfort. The object of the study was to uncover information that water safety instructors and agencies might pass along to their students and to the public.

An attempt was made to measure, by means of an attitude scale constructed for this purpose, the attitude of 132 male Grade X physical education students toward eating as a hazard to swimming; and to relate this attitude and the previous ingestion of a picnic-type meal to the perception of discomfort, fatigue, water temperature, length of swim, feeling of hunger and cramp.

While the limitations of the methods employed and the lack of a representative sampling procedure do not allow a generalization to the general public, the results of this study appear to indicate that, while there is a tendency for swimming ability to influence the discomfort of a swimmer following the ingestion of food, neither the previous ingestion of food, nor the attitude of the swimmer toward food as a hazard to swimming presented a hazard during an immediate ten-minute swim.





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## CHAPTER I

### STATEMENT OF THE PROBLEM

#### I. INTRODUCTION

Organizations and individuals concerned with swimming and water safety have, for many years, been demanding that their students "wait at least two hours after eating before going into the water." (9:3). Apparently this "safety rule" has been emphasized year after year without substantiation by some form of scientific investigation. Yet interviews with swimmers of many skill levels would indicate that many people have flaunted this rule and yet are alive today. They have not succumbed to the dreaded "stomach cramp". Can it be that our accepted authorities in this field of water safety are overly cautious in the formulation of safety rules and are perpetuating, in fact, a myth?

What does the conscientious swimming instructor tell the seven-year old? What information should be given to the mother and her children at the beach? After eating an ice cream cone, must children wait on the beach for two hours before they are allowed to go wading?

This study is not primarily concerned with the competitive athlete, but with those individuals who look upon swimming as a form of recreation only. It is intended to uncover



information that may be passed along to those people who may someday like to go swimming after a meal and who will want to know what influence the ingestion of food has upon an immediate swim. Only with this information before them can they determine their own personal rule for swimming after eating.

In an earlier study the writer (1) found some indication that swimmers might be predisposed to thinking that they would experience a cramp if they ate prior to going swimming. And, as has been indicated for years, many organizations concerned with water safety have been publicizing "safety rules" conceived to be factually based, to convince the general public that it is, in fact, dangerous to swim immediately after the ingestion of food. Apparently these pronouncements have been based upon rather scanty evidence and, in some cases, perhaps no evidence at all.

## II. THE PROBLEM

### Statement of the Problem

This study is an attempt to answer the following major questions:

(i) Are self-reports of perceived well-being, discomfort or pain following a ten-minute swim related to the consumption of food immediately prior to the swim?





(ii) Are self-reports of perceived well-being, discomfort or pain following a ten-minute swim related to attitudes held by swimmers toward eating as a hazard to an immediate swim?

Consideration will also be given to the effect of attitude and food upon the distance travelled in a given time, the swimmer's perception of his degree of fatigue and/or "cramping", his perception of hunger and his estimate of the water temperature encountered while swimming.

#### Justification of the Study

Swimming is rapidly becoming a year-round activity for an increasing portion of the population. Increasing numbers of people are exposed to water activity at least once during the year and many people have taken up swimming, or a related aquatic activity as their prime form of recreation.

With more people involved in recreational swimming and with aquatics playing a major role in many physical education programs, many swimmers find themselves entering the water immediately after a meal or a light snack. Therefore, for administrators, teachers, and water safety information officers, the question, "Is this practice dangerous?" must be answered unequivocally and scientifically.



Swimmers often claim to have what they call "cramps". Swimming instructors and lifeguards have frequently substantiated such claims when they have been called upon to massage the part of the body affected and have noted the knotted characteristic of the muscles involved. Sometimes swimmers use the word "cramp" to describe a form of discomfort in the abdomen or lower thoracic region which cannot be palpated by another person and therefore cannot be confirmed in the same sense that a leg cramp can be observed or palpated. It would appear, therefore, that the word "cramp" is commonly used to describe a relatively wide range of discomfort ranging from mild unpleasantness without any external evidence of the physiological phenomena being experienced by the victim, to a report of excruciating pain by the swimmer which can be substantiated, in part, by an observer who can palpate what appears to be a "muscular seizure" and can observe the writhing behavior of the victim.

The writer contends that if a relationship can be scientifically established firstly, between the consumption of food immediately prior to swimming and any predisposition to experience severe discomfort; or secondly, between attitudes or opinions held about the alleged dangers of consuming food immediately prior to swimming and the actual number of





reported cases of experienced discomfort or severe "cramping", then the study will be well justified.

This study, therefore, seeks to provide an additional source of experimentally-derived, factual information upon which administrators may base scheduling decisions, and upon which other researchers may contribute toward a sound body of aquatic knowledge.

#### Limitations to the Study

The generalizations to be drawn as conclusions in this study are made in the light of the following limitations:

Sample. The research resources of the investigator and the inevitable limitations associated with making arrangements for the involvement of students as subjects during school hours made it necessary to utilize groups of subjects which cannot be regarded as a representative sample of the Grade X population of Canada, Alberta, nor, for that matter, the City of Edmonton.

The subjects were male students of six Grade X physical education classes in two Edmonton high schools. As such they were conceived to be typical of their respective districts, age groups, grade levels and skill abilities. Since they were regular members of physical education classes which were conducted under the supervision



of qualified physical education teachers, they were conceived to meet the health standards accepted in their respective schools for students undertaking the rigors associated with a typical physical education class in these schools. Therefore, despite the descriptive term "typical", the sample of subjects cannot be regarded as statistically representative of the Grade X population of Canada, Alberta or Edmonton. This is a major limitation of this study.

Time of day. All swimming sessions were conducted within school hours.

Amount of food intake. All subjects were provided with the same amount of food. However, no control over the food already present in their stomachs could be effected in non-residential school settings.

Environment factors. Although this study was conducted in indoor swimming pools, rigid control of the temperature of the air and water were not fully achieved.

Emotional factors. No control of such factors as parent-induced anxiety due to fore-knowledge of the contemplated swim following ingestion of food was possible; nor were previous traumatic experiences in connection with aquatic activities by any of the subjects taken into account in the selection of subjects.





Motivation. All subjects were subjected to similar instructions and encouraging remarks by the investigator prior to their respective swims. Presence of parents, peers and members of the opposite sex was not permitted. Some element of competition, however, may have crept in as an uncontrolled factor if students sought to engage in competition with either a classmate or a previously set personal standard.

Prior exercise. No control was effected over possible changes in the nature of exercises which may have been experienced on the day prior to the swim which may have tended to develop stiffness, tiredness or other physiological manifestations in the subjects during their swims.

Semantic problems. Although the words used on the scale provided in the After Swim Questionnaire were of common usage, some differences in interpretation of words were anticipated. Similarly, even if some method could have been designed to measure discomfort intensity, students would likely have utilized different words to describe the degree of discomfort experienced.

Attitude scale. This study was further limited by the degree of reliability and validity of the attitude scale developed to measure the attitude of the subjects toward the major attitude-object of the study.



Statistics. The generalizations deduced were also limited by the limitations of the particular type of statistics applied to the data.

Persuasion consistency and plausibility. Although every effort was made by the investigator to perform the roles of the persuading agent consistently, convincingly, and with equal plausibility in both "negative persuasion" and "positive persuasion" sessions, it cannot be presumed that every performance was equally effective.

#### Definition of Terms

Cramp. A cramp is any form of unpleasantness or discomfort which the individual subject perceives to be a cramp. In other words, a cramp has occurred if the subject feels and reports that he has had a cramp; although it may not be observable or palpable by another individual.

Discomfort. Discomfort is an unpleasant physical sensation or feeling as it is perceived and reported by the subject. It is reported by the subject or recorded by the examiner on a scale which forms a single continuum from "comfort" to "discomfort".

Hazard to swimming. A hazard is any discomfort or subjective experience that might influence the ability of the subject to propel himself through the water for a ten-minute period of time.





Attitude. Attitude is the " . . . sum total of a man's inclination and feelings, prejudice and bias, preconceived notions, ideas, fears, threats and convictions about any specific topic . . . ." (69:2). The topic, in this study, will be referred to as an attitude-object.

Attitude-object. An attitude-object is any concrete, social, or subjectively-defined entity toward which a subject has positive or negative feelings which are assumed to vary in intensity from subject to subject. In this study the attitude-object is a subjectively-defined entity, namely, the attitude toward the hazards to swimming posed by the ingestion of food.

Opinion. An opinion is a verbal or written expression of an attitude. For the purposes of this study a response to a particular item among a choice of items is accepted as an opinion.

Attitude toward the hazards of swimming following the ingestion of food. The subject's attitude as measured by the attitude scale prior to each swim.

Attitudes of hazard or non-hazard. The scale value of the most extreme attitude that eating is a hazard to swimming is 8.7. The extreme on the other end of the continuum is 0.5. An attitude of hazard is any attitude that



has a scale value of 4.6 or less is an attitude of non-hazard.

Attitude change. A subject's attitude has undergone a change when a score difference of a magnitude of 1.0 or greater is obtained on the attitude scale designed to measure attitudes toward hazards of swimming following the ingestion of food.

Judges. Judges are those persons who categorize the statements of opinion used in developing the attitude scale. Judges were recruited from qualified examiners of the Alberta Branch of the Royal Life Saving Society Canada.

Persuasion. Persuasion is anything, recognized or unrecognized by the potential respondent, or persuading agent, that causes, or attempts to cause, a change of attitude.

Swimming. Swimming is any method used to travel through the water, including pushing off the side, periodic walking, touching the bottom, etc., without the use of artificial or mechanical aids.

Age. The subjects' ages will be taken as their full age in years at the time of their first swim.

Swimmer. A swimmer is anyone who is able to swim, without any rest and without touching the bottom, at least



ten widths of a forty-two feet wide swimming pool.

Inexpert swimmer. An inexpert swimmer is anyone who is unable to swim, without any rest and without touching the bottom, at least ten widths of a forty-two foot wide swimming pool.





## CHAPTER I

### STATEMENT OF THE PROBLEM

#### I. INTRODUCTION

Organizations and individuals concerned with swimming and water safety have, for many years, been demanding that their students "wait at least two hours after eating before going into the water." (9:3). Apparently this "safety rule" has been emphasized year after year without substantiation by some form of scientific investigation. Yet interviews with swimmers of many skill levels would indicate that many people have flaunted this rule and yet are alive today. They have not succumbed to the dreaded "stomach cramp". Can it be that our accepted authorities in this field of water safety are overly cautious in the formulation of safety rules and are perpetuating, in fact, a myth?

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This study is not primarily concerned with the competitive athlete, but with those individuals who look upon swimming as a form of recreation only. It is intended to uncover





## CHAPTER II

### REVIEW OF THE LITERATURE

#### I. THE NATURE OF ATTITUDE

To understand the use of attitude measurement tools one must first look at the history and meaning of the term "attitude".

Although often used with different connotations, the term attitude has been a part of psychological literature for a great number of years. It was not until 1918, however, that attitude received a prominent place as a social psychological variable. It was at this time that Thomas and Znaniecki (61) defined the study of social psychology as the "scientific study of attitudes".

Definitions of the term "attitude" have been both abundant and varied. A few of these will serve to illustrate the range. Thurstone (69:2) has defined attitude as denoting the ". . . sum total of a man's inclination and feelings, prejudice or bias, pre-conceived notions, ideas, fears, threats and convictions about any specific topic. . .". Breer (8:40) sees an attitude as ". . . simply a generic term for an individual's cognitive, cathetic, and evaluative orientations toward objects in his environment." Scott (52)



utilizes the term attitude to refer to certain regularities within an individual. These regularities include his thoughts, feelings and predispositions to act toward an aspect of his environment. This predisposition to act is also referred to in discussions of attitude by Newcomb (38) and by Remmers (42). As used technically, attitude is regarded as a hypothetical construct which is a special kind of concept referring to a number of unobservable properties within an individual which are inferred to exist from some observable forms of behavior. It is regarded as a relatively stable variable, reflecting both direction and intensity of feeling toward an attitude-object which may be either concrete or abstract.

These few definitions indicate that consensus as to the meaning of the term attitude has not yet been established. Nevertheless, the pursuit of definition continues. For example, most so-called "attitude research", writes Bain (6:940), "is really 'opinion' research." He notes that much of the confusion arises from an emphasis upon hypothetical subjective factors, and from attempting to differentiate attitudes from values. To counter the scientific awkwardness of dealing with subjective elements Bain defines attitude as " . . . the relatively stable overt action of a





person which affects his status in groups." (6:956). This view of attitude, however, would appear to be unique in the literature.

Remmers (45), Newcomb (40), and Thurstone (69) see attitudes as being complex systems of feelings, that encompass beliefs, values and preferences. Individual attitudes are woven together into increasingly complex lattices, enlarging and growing with the changing environment as new attitudes and attitude-objects are incorporated into the system. In summary, it appears that most scholars utilize the term "attitude" as an all encompassing and convenient way of referring to the predisposition that exists within the organism to respond in a relatively predictable way toward a concrete entity, a social object, or a subjectively-defined feeling-state or belief.

## II. THE MEASUREMENT OF ATTITUDE

However latent or covert attitudes may be, their measurement, at the present state of development of this field of study, depends primarily upon some form of overt behavior. This behavior is usually an expression of opinion obtained through a response to an open-ended question or through a choice made of an item from a series of prepared





statements purporting to represent a range of opinions and therefore of attitudes toward a given attitude-object. In fact, Thurstone (69:7) defines the term "opinion" as a "verbal expression of attitude". Opinions, then, have been, and are being, used to measure attitudes on the assumption that opinions adequately represent, for some purposes, the cognitive, cathetic, and evaluative components of an attitude. This assumption underlies most, if not all, public opinion surveys. A second assumption underlying most methods of attitude measurement, regardless of the techniques employed, is that attitudes are measurable along a continuum which can be scaled to facilitate objective quantification.

As with other areas of science, through objective methods of quantification research operations and results may be communicated. Moreover, measurements and scaling devices permit the possibilities of discovering and establishing relationships among phenomena. Functional relationships may be identified when a given variation of one variable is found to correlate with a variation in another variable. The search, therefore, in the study of attitudes, is for instruments which infer a certain underlying reality to the hypothetical mental structures referred to as "attitudes". The quest continues for attitude scales which increase the descriptive power of the social scientist and reveal more dimensions of attitudes.



This review attempts no more than to indicate the general nature of attitudes, the most frequently used definitions, some methods of data collection, and some techniques of placing the data on a continuum.

There is, of course, a close interrelationship between all four of these aspects. For any interpretation of results to be made, there must necessarily be a theoretical foundation. Such a theoretical underpinning links the definition of the hypothetical construct and the operational definition of the attitude with the methods of collecting data and the processes and assumptions of "scaling". The problem in classifying methods of data collection and categorizing measurement techniques is that they do not usually lend themselves to placement into mutually exclusive classification compartments. One method of data collection may be categorized as "disguised and unstructured" by one writer and as "disguised and structured" by one writer and as "disguised and structured" by another.

Before summarizing the data collection methods used in attitude research it is perhaps useful to briefly review the four classifications of scales into which all presently used attitudinal measuring instruments may be placed. In ascending order of power the four types of scales are nominal, ordinal, interval and ratio scales. By the phrase "ascending order of power" is meant that, for example, providing the





properties of the data being measured conform to certain criteria, the ratio scale can be used to measure not only the dimensions which can be measured on the other three scales, but also additional dimensions unique to itself. Therefore, it is regarded as having more power.

Measurement, in its broadest sense, according to Lindzey, " . . . is the assignment of numerals to objects, events or persons, according to rules . . ." (35:337). When the underlying assumptions have been made explicit, when the properties of the phenomena being measured meets the criteria of a particular scale, and when the numerals have been assigned according to some rules, then it can be said that some form of scale has been created. Basically, all scales named after their inventors (such as Thurstone, Lickert or Guttman) are derivatives and modifications of nominal, ordinal, interval and ratio scales.

Nominal scales. Classification based on a single property is the most primitive form of measurement. Nominal scales simply classify objectives into two or more mutually exclusive categories merely indicating that objects are different from each other. The simplest scale dealing with a single property appears to be what is often called a "none/some" or "absence/presence scale" which, as inferred,





dichotomizes objects into groups according to whether or not the property under study is present or not. However, it is possible to use nominal scales on the basis of certain arbitrarily-set "cut off" points which are presumed to be discriminatory in showing certain amounts of a given property. Usually, the numbers 0 and 1 are assigned for computational convenience so that data may be counted and thus interpreted in terms of such statistics as frequencies, percentages, proportions, modes, coefficients of contingency and chi-squares.

Ordinal scales. This type of scale ranks objects in order of the amount of a property under study without specifying how much "more" or "less". This scale presumes that each case may be ranked on a continuum in a clearly defined order, but it does not have the capacity to indicate how much more of a given property the top ranking object has over the second ranking object as compared to the amount of the property which the second ranking object has over the third ranking object. In other words, the amount of differences in the property under study between two cases ranked 1 and 2 do not correspond to the differences between two cases ranked 2 and 3.

In attitude studies, because attitudes range through bipolar scales from "likes very much" through a neutral



point in the continuum representing "neither likes or dislikes" to the other extreme pole labelled "dislikes very much", the neutral point may be considered as providing a natural point of origin. Frequently there is no natural point of origin which corresponds to a zero amount of the property under study. In this case, an arbitrary point of origin is used.

The ordinal scale has greater power than the nominal scale in that properties which can be summarized on statistics applicable to data analyzed on a nominal scale can also be statistically summarized by statistics applicable to an ordinal scale. In addition, a researcher may analyze data measured on an ordinal scale by using such statistics as medians, percentiles and rank-order correlations.

Interval scales. In these scales not only do the order of the numbers in the scale correspond to the order of magnitude of the property, but the difference between any pair of numbers is of the same magnitude as the difference between any other pair of numbers. These scales permit more exact measurements since a common unit of measurement is available.

Although most of the attributes with which social scientists deal make it difficult to devise scales which have equal intervals for measuring them, progress has been made along this line, especially in research dealing with the





measurement of attitudes. Usually the technique is to make use of a large number of judges who place items along a continuum with a large element of consensus as to equality of the intervals.

Again, if units of the scale are equal, then interval scales have additional power over nominal and ordinal scales in that, data can be described and summarized by not only the statistics applicable to the nominal and ordinal scales, but also by computed means, standard deviations, product-moment correlations and many other statistics.

Ratio scales. If an interval scale has a natural origin of number 0, representing zero amount of the property being measured, the type of scale is classified as a ratio scale. In this type of scale, the numbers assigned to various amounts of the property under study bear a direct relationship to the absolute amount of the property. With such a scale one case can be described as having a specified number of units more of the property than another. Moreover, one case can be described as so many times as large as the second case.

The merit of ratio scales is, that if the data collected corresponds to the criteria for a ratio scale, all types of statistical procedures are applicable.





Briefly, in summary, the four basic types of scales have been described. The assumptions and principals underlying these four basic types are related to those attitude measurement instruments which are identified with particular names such as Bogardus, Thurstone, Lickert and Guttman. The nominal scale is primarily identified as simply consisting of mutually exclusive categories which do not provide measurements of "more" or "less". The ordinal scale provides ranks but the distance between two adjacent ranks at one part of the scale do not necessarily correspond to the distance between two ranks at another part of the scale. The interval scale provides a basic unit of measurement which is equivalent at different places in the scale. Ratio scales have not only this quality, they also have an absolute zero which increases the number of statistics which can be used to analyze data and, therefore, in effect, to describe the interrelationships between and among phenomena.

As has been indicated, methods of collecting data must be planned within a theoretical conceptual framework which maintains an understanding of the assumptions underlying the various kinds of scales and the criteria of the phenomena that can be measured with validity and reliability.

While there exists, at present, a considerable variety of methods and approaches to the problems of collecting and



scaling data "an investigator who must chose one of the methods can find very little information on which to base his choice". (35:365). Apparently, the investigator must make two initial decisions: Firstly, is he to use a test that is structured on non-structured and, secondly, is this test to be disguised or non-disguised?

While disguised methods are available they are usually of the "projective" type and are suitable only for individual testing. These tests, at their present state of development, have been criticized as being too subjective and, therefore, of low reliability which makes them undesirable for test-retest designs.

Attitudes may be studied through the non-structured approach of a free response interview or questionnaire approach with many open-ended questions. While these are frequently classified as non-structured, they are direct in the sense that the subject realizes his attitudes are being observed.

### Scaling Methods

Lindzey (35:344-363) in a highly technical chapter elaborated on what he called the "six major scaling methods". They were: the judgment methods, the method of summated rating, scalogram analysis, the unfolding technique, latent





structure analysis and rating methods. No depth review of these scaling methods will be treated here. However, following a brief reference to reliability and validity of attitude scales the Thurstone method of equal-appearing intervals and the modification of this technique will be outlined in considerable detail since this study was based on the modified Thurstone method of equal-appearing intervals which is classified by Lindzey as one of the "judgment methods".

Reliability and validity. The reliability of attitude scales has usually been determined through the use of internal consistency. Validity, however, is another problem. Since attitude, as a latent variable, is impossible to observe directly, face or intrinsic validity is relied upon rather heavily. Another approach is to use reference groups, whose attitudes are inferred from the actions of their members. A possible procedure that may reduce the obvious deceptiveness of this approach may include:

- (i) taking into account the many components of attitudes,

- (ii) paying attention to the social context of which the individual is a part, and

- (iii) taking greater care in defining the kinds of behavior which an attitude scale is expected to predict.





Of the many techniques available, one of the better known and perhaps the most widely used is the scale developed by Thurstone.

Method of equal-appearing intervals. The method of equal-appearing intervals, or Thurstone's method, makes use of the fact that persons are able to accurately place objects along a continuum. That is, the subject is able to divide statements of opinion into catagories that appear to differ by approximately the same number of equal units. Thurstone (67)(68)(69)(70) makes use of this "law" in the construction of an attitude scale:

1. Statements of opinion are collected about the attitude object under study.
2. A large number of judges, usually over one hundred, sort these statements into eleven groups. These groups should appear equally spaced along the continuum. There is no assumption as to the distribution of statements into these eleven catagories.
3. Data is tabulated for each statement to obtain the median catagory assigned by the judges as well as a measure of the spread of the judges rating. The measure of consistency used is the inter-quartile range, that is, the distance between the 75th and 25th percentile, referred to as a Q.



4. Twenty to twenty-five items are chosen having a small inter-quartile range and spaced as evenly as possible along the continuum. Thurstone assigns median values of from one to eleven.

5. The subject whose attitude the scale is now attempting to measure responds with either an "agree" or "disagree" to each of the scrambled statements. The score of the subject is the mean of the scores of the "agree" statements.

This technique of attitude measurement developed by Thurstone and Chave (69) was first published in 1929. Since then it has undergone a great deal of scrutiny by other authors and researchers who have attempted to delve more deeply into the scale to ascertain its validity and usefulness. Although many other techniques are now available, the method of equal-appearing intervals is still a commonly used and accepted method of assessing attitudes. Certainly this method is exciting in its simplicity of development, requiring only two steps: (i) presentation of the opinion statements to a set of judges, and (ii) presentation of the best statements to the subjects who need only agree or disagree.

Modification of the Thurstone Technique. In 1928 Thurstone (67) published an article in which the object was to apply equal-appearing intervals to a continuum. This





continuum, however, was recognized to be an abstraction only. A year later Thurstone and Chave (69) published the work that was to become a guide for attitude studies for many years. These authors made several important assumptions which must be remembered when working with the proposed scale. They noted that when dealing with social values ". . . there is no simple physical stimulus value to be measured such as line length or weight." (69:2), as is most often the case when dealing with concrete physical objects. Thurstone and Chave (69:3) concede that "an attitude is a complex affair which cannot be wholly described by a single numerical index". It must also be remembered that even a physical object as apparently simple as an ordinary table cannot accurately be measured with a single measurement; and yet we claim to measure the table. Likewise, only certain dimensions of an attitude can be measured. As the scale consists of statements of opinion it becomes necessary to define this term. For purpose of this scale an opinion is considered to be simply a verbal expression of an attitude. "It expresses an attitude, supposedly." (69:7).

The method of equal-appearing intervals was developed on the assumption that the scale values of the statements making up an attitude scale are independent of the attitudes



of the rater. Initially, this assumption met with a great deal of scepticism. Ferguson (18)(19) tested this assumption in two separate experiments with groups that were known to differ widely in their attitude toward war. Separate scales were constructed from data from each group and were found to be practically identical. Ferguson (19:117), as a result of his second experiment, concluded:

.... that at least for the attitude variable under consideration he has confirmed the assumption of Thurstone that the scale values of the statements in an attitude scale are independent of the attitudes or the judges who are selected to sort the statements which are to make up the scale.

Hinckley (30) constructed an attitude scale to measure attitudes toward the Negro and tested the extent to which this scale was influenced by the opinion of the judges used to construct the scale. The correlation of three scale values obtained from groups known to differ widely in their attitude toward the attitude under discussion ranged from +0.94 to +0.98 (18). On the basis of these comparisons Hinckley (30:293) concluded ". . . that the scale which we have constructed for measuring attitude toward the social position of the Negro is not influenced in its measuring function by the attitudes of the subjects used in the construction".





"One's personal attitude", noted Pintner (44:44) in lending support to this view, "does not warp one's intellectual judgement as to the meaning of a statement as an expression of attitude." He also concludes that it is probably not necessary to have items on separate slips for sorting.

Seashore (53) divided 150 judges into two groups and had one group sort statements on separate slips while the other group rated mimeographed lists of the same statements on a nine point scale. These were then compared for the affect of the different systems of judging upon the inter-quartile range, the median, and the time required. Seashore (53:369) concludes: "In terms of the sorting method, which has been the standard procedure, the rating method was a very close approximation from every point of view." He also found, upon questioning the judges, that they preferred the rating method over the sorting method. He found, too, an eighty-seven per cent time saving while readying the supplies for distribution and a fifty per cent saving in recording the scales when the rating method was used.

Validation of modifications have also taken place in the scoring procedure. Sigerfoos (57), working with a scale of attitude toward any vocation, found that arranging the items of the final instrument in ascending or descending order of scale value and using the median scale





value of the items endorsed as the individuals score gave results as valid as arranging the items in random order and using the arithmetic mean of the scale values as the subjects score as advocated by Thurstone.

### III. CHANGE OF ATTITUDE

While the literature abounds with discussions of propaganda, much of the material and techniques are not relevant to this study. It is evident that a great deal of the power of persuasion rests within the source and the credibility of the source.

Newcomb (40) noted that the degree of change of an attitude depends upon (i) the existing attitudes of the subject, and (ii) the transmission situation, including properties of the persuasive message and properties of the source of the message. Also of importance is the relationship between the message content and the motivational basis on which the attitude rests. In this same vein Newcomb goes on to note that the change is relevant to the grounds on which the object has attained its centrality for the individual. Other considerations would include:

(i) The source must not appear to be so far away from the subject's attitude so as to be written off at the start.



(ii) The source must hold other positions similar to those of the subject.

(iii) The subject must not prepare himself to disagree. That is, the persuasion should, if possible, not appear to be directed toward the subject to have the greatest effect.

(iv) The arguments must be tailored to fit the situation.

(v) If two sides of an issue are presented the resulting attitude is more resistant to change than if it were the result of a one-sided argument. However, if the two sides of the issue are equally convincing then no change will take place (56).

(vi) With education comes resistance to attitude change (40).

(vii) "The trend to simplicity can produce results that are contrary to the demands of clear thinking." (4:629).

(viii) Exploitative propaganda involves manipulating people's understanding by selecting and slanting facts. It involves manipulation of the emotions to reduce the quality of thinking.

(iv) The order of the presentation is the subject of many contradictory theories (35) and no conclusions can be reached.





#### IV. THE NATURE OF A CRAMP

The foregoing sections of this chapter have dealt with the nature, measurement and change of attitudes. This next section will review literature associated with the nature of cramps and related research.

What is a cramp? Taber (62:C-96) defines a cramp as follows:

A spasmodic, esp. [sic] a tonic, contraction of one or many muscles, usually painful. In certain occupations, the attempted use of muscle groups habitually employed may lead to a so-called 'professional cramp' though other motor formulae are easily executed by the affected muscles.

Webster's Dictionary (73:529) cites the following definition of a cramp:

. . . the painful and involuntary contraction of muscles, leading to spasm of variable duration. It is associated with rheumatic tendency and with exposure to cold. The condition may affect certain groups of muscles used in specific vocations, as in the case of a ballet dancer, musician, seamstress, etc.

Cramp has been described as the ". . . involuntary cramping of muscles accompanied by sharp pain and temporary paralysis of that body part," by Cerney (10:566), who elsewhere describes it as ". . . a symptom in which the body of the muscle goes into spasm, or over contraction, because of some lack in its physiology." (10:614). Woodard (75:27)



feels that cramps are:

. . . a spasm of muscles, most commonly of the thigh or calf muscles, due to the fact that they have been made to move through a range of movement that they are not accustomed to.

Fulton (24) refers to cramps as small ruptures within the muscle, making it painful upon contraction.

Morehouse and Rasch (39:160) describe the etiology of a cramp as:

. . . a spasm of a muscle, usually of a foot, calf or thigh, due to an incoordinated muscular movement or to the muscle being subjected to exposure to heat or cold. Cramps may also result from dietary deficiencies, particularly of calcium, Vitamin B<sub>1</sub>, and salt.

Fields (21:1067) feels that ". . . the term leg cramps applies to involuntary tetonic contractions of the calf muscles", and that these cramps may be due to disturbances of mineral metabolism --perhaps a reduction in calcium. He goes on to say that practically anything that interferes with nutrition and gas exchange of a normally innervated skeletal muscle can cause cramps, and that cramps are also seen in sodium intoxication and oxygen deficiency, unusual activity or muscular effort.

Hall (27) has shown in several case studies that if salt is entirely withheld from the diet, a painless cramp is produced. He has also shown that the administration of salt will eliminate cramps. Mauer (37) concurs with Hall and the loss of salt theory.

150  
125-0





The St. John Ambulance Association (51:115) has this to say about cramp:

Cramp is due to sudden involuntary and painful contraction of a voluntary muscle or group of muscles. It may be caused in several ways, for example, by chilling during exercise as in bathing. Cramp also occurs when there has been excessive loss of fluid from acute diarrhea, excessive vomiting or sweating. Some people are more prone to cramp than others.

What do organizations concerned with swimming and water safety have to say about cramp? The Royal Life Saving Society, United Kingdom (49:25), in their handbook note:

The physiology of cramp is very imperfectly understood, but the following is a likely explanation: --

Like every system in the body, muscles require oxygen and sugar, which are carried in arterial blood, to perform the function of contraction and relaxation. When the arterial blood supply is impaired and the muscles continue to contract a product called sarcolactic acid is produced in the muscles. This gives rise to spasmodic and agonizing pain which is known as cramp.

In the 1963 edition of the same handbook, the causes remain the same but a cramp is now ". . . caused by the sudden contraction of a muscle, and is usually located in the lower limbs." (50:51). The Royal Life Saving Society Canada (47)(48) does not mention cramp in either of its publications in 1960 or 1965. The American Red Cross (2:22) says that:





. . . cramp occurs in muscles, making in the belly of the muscle a tight hard knot which for the time being incapacitates the part of the body in which it occurs, or, at least greatly inhibits its action.

This organization states that cramp is always accompanied by pain and that tired or cold muscles are most susceptible.

If the exact nature of the cramp is elusive the cause of this phenomena appears to be even more evasive. There are many theories of the causes of cramps, a few of which have been introduced above. Most of these, however, are only theories, and are backed by few scientific facts.

There would, in fact, appear to be several somewhat distinct types of cramp. A psychological cramp may be due to a massive impulse sent to the muscle via the nerves from the cortex of the brain and is closely related to pre-game tension, strain, or anxiety. Karpovich (31:371) describes it as:

. . . a lowering of the threshold of irritability of motor nerves, resulting in a sudden increase in the frequency of the nerve impulse going to the muscle, and some of the muscle units may contract beyond their usual limits.

There appears to be another type of cramp due to excessive heat. This may result from working in hot and humid climates such as might be found in a foundry. Cole and Peustow (12) describe it as being caused by a loss of salt and body fluid due to excessive perspiring and feel



that it may be associated with heat exhaustion. Williams (71) gives further evidence of this sodium depletion due to excessive sweating or hyperventilation and dehydration, which he terms "hyponatraemia". The body's average daily intake of sodium chloride salt has been estimated at between five and fifteen grams -- about twenty times the minimum requirement of the body to maintain a metabolic balance of salt. In profuse sweating the athlete or worker may lose three or more grams of this salt per hour. The inability of the sweat glands to regulate salt loss would heighten the possibility of this cramp due to an alteration of the ionic concentration in the blood which could lead to a breakdown of the muscle function.

Cramps may, at times, result from a circulatory defect brought about by physiological or material factors, or both. An example of this type is a night cramp which may be due to tight bandages, clothing, anxiety, incorrect diet, or to lying or sitting so that circulation to some part of the body is restricted.

The professional cramp is caused by the holding of muscles in a particular position for some length of time while they are exerting continued pressure.

Cramps may be due to disease or a structural fault.







Cerney (11) mentions diabetes as one cause, whereas Webster's Dictionary (73) notes rheumatic conditions.

However, the most common and widely experienced cramp; one that most people will develop at least once during their lifetime, is a cramp due to excessive exercise. Cerney (11:571-2) notes:

After a practice or a game--any plantar flexion of the foot triggers the over contraction of these muscles. This could be caused by lack of conditioning, fatigue, nutritional deficiencies, exposure to weather changes (or cold water), restrictive gear, disease (diabetes), participation too soon after illness, foot condition (short first metatarsal, heel pronation), a short leg, excessive sweating, diarrhea or vomiting causing alkalosis, lack of sweating, water intoxication, neurotic behavior, fear or worry, infective foci of the body following a direct blow to the leg, badly applied tape.

Tourney (71) describes this type of cramp as being due to a lack of warm up and a failure to stimulate circulation before exercise. The muscle is then unable to remove the products of exercise.

The authors, texts, and handbooks referred to above, are, without exception, respected and accepted authorities in their field. Yet in something as seemingly simple as a cramp, these "experts" disagree both in the description of the phenomenon and in theories of the cause. It is understandable, then, that the cause should remain hidden when the problem cannot yet be defined.



It is difficult to believe that common agreement on the meaning of "cramp" cannot be reached. Surely this polychotomy of opinion stands as an obstacle to determining the cause of cramp.

The foregoing definitions and theories notwithstanding, the literature has led in a complete circle re the nature of a cramp and still one might ask-- What is a cramp?

#### V. CRAMP AS A HAZARD TO SWIMMING

##### FOLLOWING THE INGESTION OF FOOD

The Canadian Red Cross Society draws attention to work done by Steinhaus (52), in which he deals with the effect of physical exercise on the motility and secretory activity of the stomach. It appears that exercise itself, if unaccompanied by strong emotion, does not significantly modify stomach motility. Steinhaus also reports that he was unable to discover any changes in the electrocardiogram that would indicate a reduced blood supply to the heart following a meal. There was, however, a mechanical shift of the heart to accomodate the distended stomach but Steinhaus notes that this is harmless. This would seem to eliminate the theory of eating being a cause of stomach cramps during exercise. Yet lay organizations continue to





perpetuate the notion that eating is a hazard to an immediate swim.

The Canadian Red Cross Society (9:5) issues the following warning:

Many drownings are said to be caused by cramps . . . . A cramp in the stomach is the painful type and is probably the result of entering the water too soon after eating.

This society cautions the public thusly:

. . . wait at least two hours after eating before going into the water. Much of your energy is used to digest the food in your stomach. If you should do too much at this time, painful cramps may result. (10:5)

The American Red Cross (2:24) comments on the illustration of a doubled up swimmer:

Stomach cramp, as before stated, is not an uncommon result of swimming too soon after eating but what muscles are affected is not known. All that is known is that the sudden attack is accompanied by such pain that quite involuntarily the knees are drawn to the chest as the head is drawn down and forward.

The Royal Life Saving Society, United Kingdom (49:25), lists circumstances inducing cramp:

1. Cold.
2. Sudden muscular exertion.
3. Nervous shock.
4. A blow or injury to the muscles.
5. Entering the water soon after a meal or when hungry.

Other than the case study of Hall (27) mentioned earlier in which he removed salt from the subject's diet





to produce a cramp proneness, and administered salt to remove this tendency, there appear to be few other studies associated with the relation between swimming and eating. Research conducted at the Georgia Institute of Technology by Lanoue (34) attempted to answer the following questions:

1. How frequently do cramps occur while swimming?
2. Are cramps more likely to occur in swimming classes held immediately after a meal?
3. Does swimming ability have any bearing on the occurrence?
4. Are fat folk as susceptible as thin ones?
5. How disabling are they?
6. Can cramps be eliminated or minimized in the water? (34:153).

He surveyed about 1,400 students enrolled in the required swimming classes who amassed a total of about 30,000 man-hours in the water between June, 1945, and June, 1946.

A total of only sixty-three cramps occurred during the year and not one of the subjects was forced to the side of the pool by the cramp. The following muscles and frequencies were involved in cramping: 31 calf, 8 foot, 5 forearm, 4 hand, 4 quadriceps, 4 hamstrings, 2 triceps, 2 pectorals, 1 neck flexor, 1 gluteal and 1 biceps. On the subject of stomach cramps, Lanoue (34:154-5) has this to say:



As an interesting sidelight we have made it a practice to ask at all of our classes if any student had ever had a stomach cramp while swimming. To date, after questioning over 10,000 boys, we have not encountered one person who has had one, or one person who claims to have actually seen one. There have been a few who 'knew a person who knew a person,' etc.

In many years' experience with swimming and swimming men the writer (Lanoue) has never seen one nor met a dependable swimming man who has seen one. This is amazing, to say the least, in view of the large number of drownings allegedly caused by stomach cramps . . . . It appears probable that we have been perpetuating, unthinkingly, an invention of newspaper writers, which is no more than a notion, educed by untrained observers, based on the flimsiest of evidence.

Abell(1:15) also says that it has been his

. . . experience with several thousand swimmers and many instructors, coaches, and lifeguards, that the stomach cramp is merely a figment of our imagination.

Lanoue's (34:156) results of swimming after eating were as follows:

---

Class Hour:	8:00	9:00	10:00	1:00	2:00	3:00
Cramp Occurrence:	7	14	10	11	5	16

---

Lanoue presents evidence to show that even as exhaustive a swim as swimming a mile while clothed or treading water for forty-five minutes with hands tied behind the back produced no appreciable effects from swimming immediately after eating.







Lanoue further observes that his college freshman subjects eat about the same meals as the average beach crowd with much emphasis being placed upon hotdogs, hamburgers, etc.. His practice was to advise a change of eating habits only for an event such as the three hundred yard swim for time. This was the only event during which nausea occurred and much of this was avoided if the swimmer skipped the preceding meal regardless of the class hour.

Lanoue (34:156-7) drew the following conclusions:

1. Cramps are not very likely to occur under usual indoor bathing conditions, and are of little importance to a trained swimmer unless speed or power is required.
2. Anticipating a cramp and stretching the threatened muscle before it has time to shorten will make the swimmer much more comfortable in the water.
3. The majority of swimming cramps will probably occur in the calf of the leg, and the remedy is to straighten the knee and hook the ankle.
4. Stomach cramps are probably greatly over-rated as a factor in drowning.
5. There is little evidence that the amount of fat has any bearing on the development of cramps while swimming, as practiced at Georgia Tech.
6. Swimming ability is apparently not much of a factor, though our scanty data indicate that poorer swimmers are slightly more likely to get cramps than better swimmers.



It would appear, then, that the teen-age population knows as much about cramps, and has as great a variety of ideas, as do the recognized authorities in this field. (1:18).

The writer, in a previous study (1), in an attempt to ascertain the relationship that exists between swimming immediately following a meal, and cramp, studied a sample of students from an Edmonton High School. The meal was a picnic type with hot dogs and a carbonated drink and the swim was of a recreational nature such as one might find at any swimming pool. The subjects were volunteers solicited from a high school population of 1300. These students were asked to swim for twenty minutes during two successive noon hours. On the first day all swimmers reported to the pool at noon without having eaten lunch. The subjects were instructed to swim at their own level of ability but to swim hard and vigorously so that they would be tired at the end of twenty minutes in the water. The swimmers were free to dive or swim as they wished as long as they remained active. Following this, the students completed a questionnaire.

On day two the instructions and the swim were the same as on the first day, but before swimming, the students were given ten minutes in which to eat a lunch of hot dogs and a carbonated drink. Following the swim the students were asked to complete the same questionnaire.





The results Abell obtained and his conclusions were as follows:

There were fifty-five subjects, of which thirty-three were male and twenty-two were female. There were eighteen additional partial subjects who did not complete the two days of testing.

A total of eleven students indicated that they experienced some discomfort during the swims, of these four felt less discomfort during day one than day two while four other subjects reported the opposite, that they felt more discomfort during day one than day two. Three subjects felt "a little discomfort" during both of the swims.

In drawing his conclusions in this earlier study, the writer noted that many students experienced some discomfort during the swim. Of these:

4	felt less discomfort during day one than day two.
4	felt more discomfort during day one than day two.
<u>3</u>	felt "a little discomfort" during both days.
11	

Despite the fact that all subjects ate quickly and then immediately entered the water to swim vigorously at their own ability level, every subject was able to complete the twenty minute swim.

Two subjects reported a cram: one subject in the leg and in the stomach. This subject says she is prone to cramps and ate five hot dogs. She also comments, "The more I ate the better I felt; when I got back into the water I felt lousy." Even with this cramp she was able to





complete the swim and reported only "a fair amount of discomfort", while on day one without eating, she reported a "great deal of discomfort" because of hunger. That is, even with the two cramps she was more comfortable than on the previous day when she swam without eating. The second subject reporting a cramp (pain in chest) said that she knew she would get a cramp because it always happens to her. She also said that she does not get a pain in her chest if she eats then exercises somehow other than through swimming. This subject was also able to complete the entire swim and required no assistance. In neither of these subjects reporting cramps was it evident to onlookers that they were in any kind of difficulty.

As a result of this rather brief project, Abell drew the following conclusions:

1. The best evidence available would suggest a lack of knowledge regarding cramp and its causes.
2. Swimming authorities have been perpetuating, in the guise of a fact, information that is only a notion.
3. In the tide of current propaganda swimmers are predisposed to thinking that they will get a cramp and perhaps to thinking that they actually have a cramp.
4. The fabled "stomach cramp" is not a threat to swimmers.
5. For the healthy high school student, to eat a picnic type lunch would seem to have no affect upon an immediate swim of a recreational nature. (1:21-24).



The present study is, therefore, a report of an experiment conducted to provide additional information which tends to substantiate or disprove the conclusions drawn in the pilot study reported above.





## CHAPTER III

### METHODS AND PROCEDURES

#### I. SUBJECTS

All subjects were members of regularly scheduled Grade X physical education classes in two schools in the City of Edmonton, Alberta. As was noted in the statement regarding limitations of the study in Chapter I, the fact that every high school student in Alberta or, for that matter, in Edmonton, did not have equal opportunity to be a subject limits the generalizations which can be drawn from the data collected. The investigator's research resources and the limiting administrative factors within the schools, made it necessary to accept a sample which cannot be regarded as statistically representative of the general population of high school students of Canada, Alberta, or even the City of Edmonton. What can be said is that the six groups tested were composed of one hundred and thirty-two Grade X male students who were the regular members of physical education classes in two Edmonton schools and, as such, were conceived to be normal and healthy according to the standards accepted in the respective schools for students undertaking the rigors associated with a typical physical education class under qualified physical educators.



To the degree that no expressions of dissatisfaction or dissent were heard by the investigator from students, it might be said that the subjects were "willing conscripts". On the other hand, since many favourable, and even enthusiastic, comments were heard by the investigator, the subjects might have been regarded as "volunteers". This being noted, it is perhaps only accurate to say that the classes showed a large degree of concensus in terms of their willingness to undertake the swim involved. Being part of the regular physical education curricula, no choices were given to the students as to whether or not they would participate.

The ultimate choice of schools, classes and therefore subjects, was conditioned by the following circumstances: The investigator's personal time schedule made it advisable to confine the collection of data to the period of two months in March and April, 1967. This, of course, meant that the only subjects available were those already scheduled to undertake swimming classes at this time in the Edmonton schools which had access to swimming pools. The final decision to involve students of Eastglen Composite High School and St. Francis Xavier High School was made on the basis that the two pools at, or near, these schools were the same in design except there were differences in the depth of the water.





Moreover, the units of instruction in swimming were either just starting or were progressing. The decision was also conditioned by the investigator's desire to involve students from opposite parts of the City so that there would be much less likelihood of communication between students who were subjected to contrasting "information" regarding the alleged hazards of swimming following the ingestion of food.

The subjects were placed into six groups which are referred to, in this study, as groups A, B, C, D, E and F. Groups A and D were classes of St. Francis Xavier High School which were about to begin a unit of swimming. These groups or classes had a fifty-minute class period but the subjects had to walk a distance of about 270 yards to the Sports Centre Swimming Pool. However, the fact that the noon hour break was continuous with the class hour meant that the lengths of the class periods available for the swim and the collection of data, were about the same as those at Eastglen Composite High School where the periods for groups B, C, E and F were forty-three minutes in length. At Eastglen High School, because the school was connected to the Eastglen Swimming Pool by a tunnel, this period was long enough to permit adequate time for testing. Groups C and E were just completing three-week swimming units while groups B and F were about to start at the time when the subjects were to be involved.





## II. SWIMMING

### Safety

During every swim there was at least one employed lifeguard in attendance. The class teacher and the investigator were also prepared to assist the lifeguard if necessary.

### Instructions to Swimmers

The subjects were assigned a position along the length of the pool with the inexpert swimmers in the shallow end. Subjects were permitted to walk on the bottom, to push off and touch the sides of the pool and to start the first width with a dive. They were encouraged to go as far as possible and instructed not to rest or to stop at any time during the ten-minute swim. Inexpert swimmers were asked to attempt to swim a few feet as often as possible but to keep moving. All subjects were to count the number of widths completed. The subjects were allowed to swim in any manner that they wished and to change methods at any time. No attempt was made to introduce a competitive aspect during this swim. It is acknowledged, however, that the participants may have been competing informally against each other or against previously set personal standards.



### III. FOOD

With the exception of two early morning meals prepared by the author, all food was prepared in either the cafeteria at St. Francis Xavier High School or in the food laboratory at Eastglen Composite High School. The food consisted of hot dogs with sweet relish and an orange flavoured, carbonated beverage. Each subject was required to eat three hot dogs and drink ten ounces of the beverage during the ten minutes prior to the swim.

### IV. PERSUASION

Each of the four experimental groups spent one class period between the two swims in a class-room situation. During this time the investigator presented the subjects with information designed to change their attitudes with respect to whether or not eating prior to swimming is a hazard; a change of attitude being measured on the attitude scale developed for this purpose. The content of the materials to persuade the subjects to modify their attitudinal predispositions was given as convincingly as possible by the investigator with the emphasis on letting the film shown, and written materials distributed, "speak for themselves".





In all persuasion sessions the arguments presented were as one-sided as the investigator deemed would be received by the subjects as reasonably plausible and, in each instance, boys from the class volunteered information which lent support to the particular information being presented. These contributions by the class members were unsolicited and unplanned.

The information consisted of copies of the appropriate material and references from Chapter II as well as a portion of a film "There's One At Every Beach", obtained from the Canadian Red Cross Society in which a man was portrayed eating and then getting into difficulty while swimming.

In an attempt to lend greater authority to the information a medical doctor was reported to be on his way to each persuasion session. When this doctor failed to arrive, the author presented the arguments as "the doctor might have presented them".

In all instances the class teacher was helpful in supporting the author and the information being presented.

When all of the testing had been completed, either the teacher or the author presented both sides of the argument to the students to enable them to draw their own conclusions. At this time the study was explained in detail for their information and questions.



## V. EXPERIMENTAL DESIGN

TABLE I

## EXPERIMENTAL DESIGN

Groups	A	B	C	D	E	F
Swim One	No Food	No Food	No Food	Food	Food	Food
Persuasion	Hazard	-	Non- Hazard	Hazard	-	Non- Hazard
Swim Two	Food	Food	Food	Food	Food	Food
Number	23	24	20	16	25	24
Time of Class	1:00 p.m.	9:39 a.m.	10:25 a.m.	11:04 a.m.	8:53 a.m.	1:15 p.m.
Participa- tion Days	Tue Wed Thur	Mon Tue	Mon Tue Wed	Mon *Thur Fri	Mon Tue	Mon Tue Wed

\* This persuasion session was conducted at  
2:40 p.m.

Each of the four experimental groups swam on the first day, was in the persuasion session for the second, and swam on the third day. The control groups, to avoid the possibility of information being exchanged among subjects, swam on each of the two consecutive days in which they participated. The sessions were so arranged that no





persuasion took place in their school until after the control groups had completed their second swim.

### Testing Procedure

TABLE II  
TESTING TIMETABLE

Time	Activity
5 minutes	Complete Before Swim Questionnaire
10 minutes	Feed subjects (if required), outline study, instruct subjects about the swim and the After Swim Questionnaire
10 minutes	Swim
10 minutes	Complete After Swim Questionnaire

### Collection of Data

On the second participation day personal information was collected from each subject as to his name, age (at the time of the first swim), height, weight, class, school, frequency of swimming during the past month (with the exception of swim one), and swimming ability.

On the day of the first and second swims the Before Swim Questionnaire (attitude measurement) and the





After Swim Questionnaire were administered.

### Treatment of Data

- (i) The attitude scale was scored and recorded.
- (ii) The after swim questionnaire was coded and entered on the information sheet.
- (iii) The change variables were calculated and coded.
- (iv) Cross classification tables were constructed between many of the variables. The statistic Gamma (25) (26) was calculated as a measure of association and the statistic Z as a measure of significance. The results of this cross-classification appear on Table VII.

TABLE III

#### CODING FOR CHANGE VARIABLES

Attitude:	measured change	$\geq -4$	$\geq -3$	$\geq -2$	$\geq -1$		$\geq 1$	$\geq 2$	$\geq 3$	$\geq 4$
	code assigned	1	2	3	4	5	6	7	8	9
Widths:	change	$> -5$	$> -2$		$> 2$	$> 5$				
	code assigned	1	2	3	4	5				
Other Variables:	change perceived	$\geq -4$	$-3$	$-2$	$-1$	$0$	$1$	$2$	$3$	$\geq 4$
	code assigned	1	2	3	4	5	6	7	8	9



## CHAPTER IV

### CONSTRUCTION OF THE ATTITUDE SCALE

An attitude scale was developed to measure the attitude of the subjects at two stages of the experiment with respect to the hazards of swimming following the ingestion of food. This chapter reviews the essential considerations in the construction of the attitude scale.

#### Type of Scale

The scale was developed using the methods proposed by Thurstone and Chave (69). While this basic Equal-appearing Interval Scale was used, it was modified as follows:

- (i) Nine catagories were used rather than eleven.
- (ii) The judges were asked to rate a list of statements rather than to sort statements on separate slips.
- (iii) The subject's score was taken as the median of the statements endorsed rather than referring to the mean.

#### Judges

Examiners of the Alberta Branch of the Royal Life Saving Society Canada were asked to act as judges of the initial statements of opinion.





### Instruction to Judges

All judges were supplied with a letter explaining the project and soliciting their cooperation; instructions for statement rating; a sample of statement rating; the list of 65 statements; and a self-addressed, stamped envelope. A second letter was mailed about one week later as a reminder to all judges who had not responded by this time.

### Communication With Judges

As the examiners asked to judge the statements were spread throughout Alberta, this portion of the development of the instrument was conducted entirely through the mail.

### Disqualification of Judges

While most of the judges probably gave careful consideration to the rating of the statements of opinion, others may not have been able to respond as efficiently. In order to locate these judges and discard them along with any judges who may have misunderstood the instructions, all responses were searched for the responses to statements 1, 11, 15, 37, 49, and 64. On the assumption that these statements could correctly be placed on only one side of the midpoint, ratings not agreeing with this assumption were considered to be "errors" and the midpoint was considered



correct. Any judge having more than one "error" for the six statements was discarded.

This resulted in the re-assignment of the ends of the continuum to the responses of several of the judges.

Judges were also disqualified if they placed twenty or more statements in any one category.

### Response from Judges

A total of 111 requests and kits were mailed to the judges. Of the 86 that were returned, 14 were discarded because of one or both of the criteria of carelessness and 7 were returned too late to be of use in the construction of the scale. Sixty-five returns, then, were used in the construction of the final instrument.

As an indication of the care which the author can assume was given to these ratings, not only was there a return of 77.5% but an additional nine judges wrote to explain that they were unable to comply with the request due to various reasons, while three judges contacted the examiner personally to apologize. If these were to be considered returns, this would mean a return of over 88% after only one follow-up letter as a reminder.





TABLE IV

## ATTITUDE SCALE STATEMENTS - INITIAL JUDGES RESPONSE

STATEMENT	Q	SCALE VALUE	STATEMENT	Q	SCALE VALUE
1	1.4	7.3	34	1.6	8.7
2	2.8	0.8	35	4.4	7.4
3	2.6	7.5	36	1.1	5.9
4	1.8	6.6	37	1.4	6.2
5	2.2	8.3	38	3.2	3.3
6	2.5	2.8	39	2.5	3.4
7	3.1	6.1	40	2.2	2.5
8	2.9	3.4	41	2.0	1.4
9	2.8	3.5	42	2.5	3.4
10	4.0	5.3	43	2.8	1.2
11	1.8	7.2	44	2.0	8.2
12	1.8	1.6	45	3.4	4.7
13	3.0	4.5	46	2.2	5.8
14	2.8	1.6	47	2.0	1.8
15	1.0	7.7	48	3.0	3.2
16	2.5	3.7	49	1.8	1.2
17	3.0	3.0	50	1.4	8.1
18	2.9	4.0	51	1.2	6.7
19	2.6	5.9	52	2.0	2.2
20	3.0	3.6	53	2.2	5.3
21	1.4	8.2	54	2.2	2.6
22	1.6	8.2	55	2.0	6.6
23	2.4	0.0	56	3.1	4.4
24	2.9	2.7	57	1.2	7.2
25	1.4	1.5	58	3.2	5.7
26	2.0	7.2	59	3.6	2.6
27	2.4	4.7	60	2.8	5.1
28	1.0	0.5	61	1.2	2.1
29	3.3	4.1	62	1.7	2.0
30	1.3	7.6	63	2.1	4.2
31	1.6	8.2	64	1.6	0.8
32	2.5	3.2	65	1.7	5.2
33	0.8	8.7			





## ATTITUDE SCALE STATEMENTS - RANK ORDER

SCALE VALUE	Q	STATEMENT	SCALE VALUE	Q	STATEMENT
0.0	2.4	23	4.5	3.0	13
0.5	1.0	28	4.7	2.4	27
0.8	1.6	64	4.7	3.4	45
0.8	2.8	2	5.1	2.8	60
1.2	1.8	49	5.2	1.7	65
1.2	2.8	43	5.3	2.0	10
1.4	2.0	41	5.3	2.2	53
1.5	1.4	25	5.7	3.2	58
1.6	1.8	12	5.8	2.2	46
1.6	2.8	14	5.9	1.1	36
1.8	2.0	47	5.9	2.6	19
2.0	1.7	62	6.1	3.1	7
2.1	1.2	61	6.4	1.4	37
2.2	2.0	52	6.6	1.8	4
2.5	2.2	40	6.6	2.0	55
2.6	2.2	54	6.7	1.2	51
2.6	3.6	59	7.2	1.2	57
2.7	2.9	24	7.2	1.8	11
2.8	2.5	6	7.2	2.0	26
3.0	3.0	17	7.3	1.4	1
3.2	2.5	32	7.4	4.4	35
3.2	3.0	48	7.5	2.6	3
3.3	3.2	38	7.6	1.3	30
3.4	2.5	39	7.7	1.0	15
3.4	2.5	42	8.1	1.4	50
3.4	2.9	8	8.2	1.4	21
3.5	2.8	9	8.2	1.6	22
3.6	3.0	20	8.2	1.6	31
3.7	2.5	16	8.2	2.0	44
4.0	2.9	18	8.3	2.2	5
4.1	3.3	29	8.7	0.8	33
4.2	2.9	63	8.7	1.6	34
4.4	3.1	56			



### Selection of Statements for the Final Scale

The rating assigned by each judge was recorded on an I.B.M. card. The cards were then sorted and frequency tables were calculated for each of the sixty-five statements. Using the graphic methods described by Thurstone (69) the median and inter-quartile range were calculated for each statement.

Statements were then scrutinized a final time for ambiguity. The twenty statements which appeared least ambiguous and having a low inter-quartile range were selected for inclusion on the final instrument. These statements along with their scale values and measures of ambiguity appear in table VI.

TABLE VI  
STATEMENTS SELECTED FOR ATTITUDE SCALE

Q	SCALE VALUE	STATEMENT
1.0	7.7	1. The possibility of getting a cramp makes swimming after eating too dangerous.
1.2	7.2	2. I do not think anyone should swim unless they wait an hour after eating.
1.2	2.1	3. I don't think swimming after a meal will do anyone any harm.
1.6	8.7	4. Most people who drown are foolish and eat before swimming.
1.8	1.2	5. I do not really believe that eating causes swimming cramps.





Table VI continued -

Q	SCALE VALUE	STATEMENT
1.0	0.5	6. It is all right to eat as much as you want and then to swim as much as you want.
1.4	7.3	7. The benefits of swimming after eating rarely pay for the consequences.
2.0	1.8	8. I have never had a cramp so there must be no danger in swimming after a meal.
2.0	1.4	9. The idea of waiting two hours before swimming is old fashioned.
2.2	2.5	10. Too much time is wasted waiting for two hours after a meal before going swimming.
1.4	8.1	11. I believe that eating really does cause swimming cramps.
1.8	1.6	12. The desirable results of swimming after eating have not received the attention they deserve.
1.2	6.7	13. I believe that if you never take chances by swimming after eating you will have a much better time.
1.1	5.9	14. Eating can sometimes cause cramps when swimming.
1.6	0.8	15. To eat before swimming enables a person to swim his very best.
1.4	6.2	16. Eating can make you sick if you go swimming.
1.4	8.2	17. Only foolish people would dare to swim after eating.
0.8	8.7	18. Eating a bunch of hot dogs and then swimming right away will cause you to have a stomach cramp and drown.
1.4	1.5	19. Swimming after eating helps you to Digest your food.
1.7	2.0	20. To swim after a meal is very restful.



## CHAPTER V

### RESULTS AND DISCUSSION

The results of the cross-classification of selected variables appear in Table VII along with the value for Gamma and the Z-score. The abbreviations used appear at the end of this table.

TABLE VII  
DEGREE OF ASSOCIATION

GAMMA	Z	ROW VARIABLE	COLUMN VARIABLE	CONTROL
0.120	0.78	Energy Prior Ch.	Comfort Ch.	
0.137	0.93	Full After Ch.	Comfort Ch.	
-0.115	-0.60	Initial Swim C.	Comfort Ch.	
-0.055	-0.28	Initial Swim C.	Comfort 2	
0.118	0.62	Initial Swim C.	Comfort 1	
-0.439	-2.46	Persuasion	Attitude Ch.	
0.065	0.37	Attitude Ch.	Full After Ch.	
0.103	0.54	Attitude Ch.	Perc. Temp Ch.	
0.055	0.29	Attitude Ch.	Energy Prior Ch.	
0.095	0.51	Attitude Ch.	Energy After Ch.	
0.005	0.03	Attitude Ch.	Perc. Dur. Ch.	
-0.042	-0.22	Attitude Ch.	Perc. Dist. Ch.	
-0.737	-5.91	Initial Swim C.	Full. After Ch.	
0.087	0.42	Initial Swim C.	Perc. Temp. Ch.	





Table VII continued -

GAMMA	Z	ROW VARIABLE	COLUMN VARIABLE	CONTROL
-0.040	-0.20	Initial Swim C.	Energy Prior Ch.	
0.086	0.44	Initial Swim C.	Energy After Ch.	
0.174	0.92	Initial Swim C.	Perc. Dur. Ch.	
0.211	1.07	Initial Swim C.	Perc. Dist. Ch.	
-0.136	-0.79	Persuasion	Widths Ch.	
-0.072	-0.36	Initial Swim C.	Widths Ch.	
0.054	-0.33	Ability	Comfort 1	
0.036	0.17	Temp. 1	Perc. Temp. 1	
0.343	1.80	Temp. 2	Perc. Temp 2	
0.014	0.03	Temp. 1	Perc. Cramp	N=20
0.043	0.06	Temp. 2	Perc. Cramp	N=20
-0.170	-0.36	Initial Swim C.	Comfort Ch.	Attitude Ch. Extreme Toward Non-hazard, N=22
-0.333	-0.54	Initial Swim C.	Comfort Ch.	Attitude Ch. Moderate Toward Non-hazard, N=13
-0.088	-0.37	Initial Swim C.	Comfort Ch.	No attitude Ch. N=84
0.100	0.14	Initial Swim C.	Comfort Ch.	Attitude Ch. Moderate Toward Hazard, N=10
0.000	0.00	Initial Swim C.	Comfort Ch.	Attitude Ch. Extreme Toward Hazard, N=3





Table VII continued -

GAMMA	Z	ROW VARIABLE	COLUMN VARIABLE	CONTROL
-0.177	-0.67	Persuasion	Comfort Ch.	Non-hazard 1, N=51
0.190	0.61	Initial Swim C.	Comfort 1	Non-hazard 1, N=51
-0.122	-0.57	Persuasion	Comfort Ch.	Hazard 1, N=81
0.043	0.17	Initial Swim C.	Comfort 1	Hazard 1, N=81
-0.085	-0.32	Initial Swim C.	Comfort 2	Non-hazard 2, N=72
0.018	0.06	Initial Swim C.	Comfort 2	Hazard 2, N=60
-0.024	-0.09	Initial Swim C.	Comfort Ch.	Inexpert swimmer, N=71
0.296	1.17	Initial Swim C.	Comfort 2	Inexpert swimmer, N=71
0.334	1.35	Initial Swim C.	Comfort 1	Inexpert swimmer, N=71
-0.256	-0.93	Initial Swim C.	Comfort Ch.	Swimmer, N=61
-0.454	-1.82	Initial Swim C.	Comfort 2	Swimmer, N=61
-0.160	0.57	Initial Swim C.	Comfort 1	Swimmer, N=61
0.000	0.00	Initial Swim C.	Comfort 1	Energy 1, N=7
-0.600	-0.90	Initial Swim C.	Comfort Ch.	Energy 1, N=7
-0.235	-0.66	Initial Swim C.	Comfort 1	Neither Tired nor Energetic 1, N=40
0.064	0.18	Initial Swim C.	Comfort Ch.	Neither Tired nor Energetic 1, N=40
0.279	1.21	Initial Swim C.	Comfort 1	Tired 1, N=85
-0.197	-0.83	Initial Swim C.	Comfort Ch.	Tired 1, N=85
-0.503	-2.12	Persuasion	Attitude Ch.	No Food 1, N=67
-0.328	-1.21	Persuasion	Attitude Ch.	Food 1, N=65



Table VII continued -

GAMMA	Z	ROW VARIABLE	COLUMN VARIABLE	CONTROL
0.110	0.49	Ability	Comfort 1	No Food 1, N=67
-0.267	-1.14	Ability	Comfort 1	Food 1, N=65
-0.215	-1.12	Age	Frequency	
-0.168	-0.67	Age	Frequency	Inexpert swimmer, N=71
-0.273	-0.92	Age	Frequency	Swimmer, N=61
1.00	0.00	Persuasion	Perc. Dur.Ch.	Extreme Comfort 1, N=2
0.211	0.84	Persuasion	Perc. Dur.Ch.	Moderate Comfort, N=59
0.086	0.34	Persuasion	Perc. Dur.Ch.	Neither Comfort, Nor Discomfort 1, N=56
0.400	0.80	Persuasion	Perc. Dur.Ch.	Moderate Discomfort 1, N=15
0.000	0.00	Persuasion	Perc. Dur.Ch.	Extreme Discomfort 1, N=0
-0.373	-2.29	Persuasion	Attitude 2 (5)*	
0.008	0.04	Temp. 1	Comfort 1 (5)	
0.085	0.41	Temp. 2	Comfort 2 (5)	
0.173	1.01	Perc. Temp 2	Comfort 2 (5)	
0.089	0.54	Perc. Temp. 1	Comfort 1 (5)	
-0.014	-0.07	Ability	Attitude 1 (5)	
0.138	0.54	Age	Attitude 1 (5)	Inexpert swimmer, N=71
0.164	0.55	Age	Attitude 1 (5)	Swimmer, N=61





Table VII continued -

GAMMA	Z	ROW VARIABLE	COLUMN VARIABLE	CONTROL
-0.358	-1.55	Persuasion	Attitude 2 (5)	No Food 1, N=67
-0.430	-1.91	Persuasion	Attitude 2 (5)	Food 1, N=65
-0.407	-2.11	Persuasion	Attitude 2 (2)	
-0.110	-0.56	Initial Swim C.	Comfort 2 (5)	
0.116	0.57	Initial Swim C.	Comfort 1 (5)	
0.194	0.94	Attitude 1	Comfort 1 (5)	
0.017	0.08	Attitude 2	Comfort 2 (5)	
-0.182	-1.05	Persuasion	Comfort Ch. (5)	
-0.211	-0.95	Age	Ability (2)	
-0.097	-0.15	Persuasion	Perc. Cramp	
0.480	3.02	Attitude 1 (9)	Attitude 2 (9)	
0.459	2.09	Comfort 1	Comfort 2	
0.150	0.53	Temp 1	Perc. Temp 1	No Food 1, N=67
-0.080	-0.24	Temp 1	Perc. Temp 1	Food 1, N=65

\* This refers to the number of intervals into which the data was compressed in Table VII.

#### Abbreviations:

- 1 Referring to swim one
- 2 Referring to swim two
- Food Referring to the condition of swim one



## Abbreviations continued -

No Food	Referring to the condition of swim one
C.	Condition
Ch.	Change
Dur.	Duration
Dist.	Distance
Energy	Feeling of energetic prior to swimming
Perc.	Perceived
Full.	Feeling of fullness
Hazard	An attitude that eating is a hazard to swimming
Non-hazard	An attitude that eating is not a hazard to swimming

## I. PERTINENT RESULTS

Food as a Cause of Discomfort

TABLE VIII

ASSOCIATION BETWEEN THE INGESTION  
OF FOOD PRIOR TO SWIMMING AND DISCOMFORT PERCEIVED

GAMMA	ROW VARIABLE	COLUMN VARIABLE
0.118	Swim Condition Day 1	Perceived Comfort Day 1
-0.055	Swim Condition Day 1	Perceived Comfort Day 2



Although there was a slight tendency for those subjects receiving food prior to swimming to experience more discomfort on the first day, this tendency was reduced and, to a very small degree, reversed on the second day when all subjects received food prior to swimming. There was a slight tendency, then, for those subjects who had received previous experience with food before swimming to experience less discomfort than those who had not had previous experience with food, as evidenced by the association between the initial swim condition and the degree of perceived comfort change ( $\text{Gamma} = -0.115$ ).

TABLE IX

ASSOCIATION BETWEEN THE INITIAL SWIM CONDITION  
AND PERCEIVED DISCOMFORT AS EFFECTED BY ATTITUDE  
ON THE DAY OF THE SWIM

	GAMMA	N	ATTITUDE
Swim One	0.190	51	Non-hazard
	0.043	81	Hazard
Swim Two	-0.085	72	Non-hazard
	0.018	60	Hazard





The effect of attitude. The effect of food upon the discomfort perceived during an immediate swim does not appear to be influenced by the attitude of the subjects. There was little association between the initial swim condition and the perception of discomfort during either of the two swims when the attitude of the subjects was held constant.

The effect of a change of attitude. Those subjects who experienced a change of attitude toward food as a hazard to swimming had a tendency to exhibit a greater or lesser degree of association between the initial food condition and the degree of change in the perception of discomfort. In Table X a negative association indicates that those subjects having no food prior to the initial swim tended to change toward a perception of discomfort while those experiencing food prior to the initial swim tended to change toward a perception of comfort. This slope is reversed for the positive association. It appears, then, that previous experience with food ingestion prior to swimming produces a reduction in the amount of discomfort perceived during subsequent swims following the ingestion of food.



TABLE X

ASSOCIATION BETWEEN THE INITIAL SWIM  
CONDITION AND COMFORT CHANGE AS EFFECTED  
BY THE DEGREE AND DIRECTION OF ATTITUDE CHANGE

GAMMA	N	ATTITUDE CHANGE
-0.170	22	Extreme toward non-hazard
-0.333	13	Moderate toward non-hazard
-0.088	84	No attitude change
0.100	10	Moderate toward hazard
indeterminate	<u>3</u>	Extreme toward hazard
	132	

The effect of ability. During the first swim the swimmer subjects who had not eaten experienced greater discomfort than the swimmer subjects who had eaten. During the second swim this tendency increased, although all subjects ate before swimming and in only five cases out of one hundred would an association at least this great be due to chance.

During the first swim those subjects, classed as in-expert, who had food experienced more discomfort than the inexpert subjects who had no food; only ten times out of one hundred would an association at least this great be due to chance. This tendency carried over to day two when





all subjects had food, although the degree of association was now reduced.

TABLE XI

ASSOCIATION BETWEEN THE INITIAL SWIM  
CONDITION AND THE PERCEPTION OF DISCOMFORT  
AS EFFECTED BY ABILITY OF THE SUBJECT

PERCEIVED COMFORT	GAMMA	
	INEXPERT SWIMMERS	SWIMMERS
Day 1	0.334	-0.160
Day 2	0.296	-0.454
Change	-0.024	-0.256

#### The Relationship Between Attitude and the Perception of Discomfort

Although there was a slight association (Gamma = 0.194) between the attitude of the subject and his perception of discomfort during the first swim, there was virtually no association between these variables during the second swim (Gamma = 0.017). This again, would appear to indicate that attitude has an influence upon the degree of discomfort perceived.

During the first swim there was some association (Gamma = 0.190) between the swim condition of prior food



or no prior food and the perception of discomfort if the subject had an attitude that the ingestion of food was not a hazard to swimming. This association was almost non-existent ( $\text{Gamma} = 0.043$ ) for those subjects who felt that the ingestion of food was a hazard to swimming.

This same lack of association was evident between the initial swim condition and the perception of discomfort during the second swim for all subjects, whether their feelings prior to the second swim were ones of hazard or non-hazard ( $\text{Gamma} = 0.018$  and  $-0.085$ , respectively).

Relationship Between Persuasion Received and the Perception of Discomfort

TABLE XII

ASSOCIATION BETWEEN PERSUASION  
RECEIVED AND THE PERCEPTION OF DISCOMFORT  
WHEN CONTROLLED FOR ATTITUDE

---

GAMMA

---



---

CONTROLS

---

-0.122

Attitude of hazard (N=81)

-0.177

Attitude of non-hazard (N=51)

---





With the arrangement of the variables of the cross classification table on which the above table was calculated the negative association indicates an increase in the degree of discomfort (or change) perceived if the subject received information indicating that eating was a hazard to swimming and a decrease if the subject received information indicating that eating was not a hazard to swimming.

Table XII, then, appears to indicate that the subject reacted to food as he was told he might be expected to react although those students who felt that eating was not a threat to swimming responded more strongly to the persuasion. It must be noted that this is not a strong degree of association.

#### The Effect of Information upon Attitude

There was a strong association ( $\text{Gamma} = 0.439$ ) between the information presented and the degree of attitude change. The subjects in both experimental groups changed their attitude in the direction of the information presented while 73.5% of the group receiving no information (other than the experience of the first swim) had an attitude change of less than one unit as measured by the attitude scale. An association at least this large would have occurred by chance only one per cent of the time.





When the contingency table was controlled for food prior to the first swim and then for no food before this swim, the measure of association remained high (Gamma = -0.328 and -0.503, respectively; N= 65 and 79, respectively).

### The Effect of Attitude Upon Secondary Variables

TABLE XIII

ASSOCIATION BETWEEN A CHANGE OF ATTITUDE  
AND A CHANGE OF PERCEPTION OF SECONDARY  
VARIABLES

GAMMA	VARIABLES
0.065	Change of fullness after swim
0.103	Change of perceived temperature
0.055	Change of perceived energy before swim
0.095	Change of perceived energy after swim
0.005	Change of perceived duration
0.042	Change of perceived distance

A change of attitude was not associated to any degree with a change in any of the secondary variables found in Table XIII.



The Effect of the Initial Swim Condition Upon Secondary Variables

TABLE XIV

ASSOCIATION BETWEEN THE INITIAL SWIM CONDITION  
AND A CHANGE OF PERCEPTION OF SECONDARY  
VARIABLES

GAMMA	VARIABLE
-0.737	change of fullness after swim
0.087	change of perceived temperature
0.040	change of energy prior to swim
0.086	change of energy after swim
0.174	change of perceived duration
0.211	change of perceived distance
-0.072	change of actual distance swam

It might be expected that subjects, having first eaten, would perceive a lesser change in their perception of fullness following the second swim than those subjects who had eaten prior to both swims. This is indicated in the relatively high association (-0.737) between these variables. Those that experienced food prior to both swims appeared to feel that both the distance and duration of the swim was greater





on the second occasion, when, in fact, they did not swim as far.

### The Effect of Ability

Ability had almost no association with the perception on discomfort during the first swim ( $\text{Gamma} = .054$ ). Swimming ability was, however, associated with age ( $\text{Gamma} = -0.211$ ) and the frequency of swimming during the past month ( $\text{Gamma} = 0.215$ ).

### Water Temperature

TABLE XV

#### WATER TEMPERATURE

	Experimental Group					
	A	B	C	D	E	F
Swim One	82	81	81	84	81	81
Swim Two	82	81	81	82	81	82

Note: All temperatures are recorded in degrees fahrenheit.

While there was almost no association between actual and perceived water temperature during the first swim ( $\text{Gamma} = 0.036$ ), during the second swim the association was great enough ( $\text{Gamma} = 0.343$ ) to have occurred by chance only five per cent of the time. The water temperature for



the second swim varied by only one degree, however, and therefore no conclusions can be drawn from this information.

Neither the actual nor perceived water temperature was associated with the perception of discomfort during either of the two swims.

### Additional Relationships

Swimming ability had almost no association ( $\text{Gamma} = -0.014$ ) with the initial attitude of the subjects.

Age was only slightly associated with the initial attitude for both the swimmer and non-swimmer subjects.

There was some indication that among those subjects that did not eat before the first swim, those of little ability experienced more discomfort than did those of much ability ( $\text{Gamma} = -0.267$ ).

The attitude of the subject prior to the first swim was a good predictor of his attitude prior to the second swim ( $\text{Gamma} = 0.480$ ,  $Z = 3.02$ ). Likewise, the comfort or discomfort perceived during the first swim was a good predictor of the comfort or discomfort that would be perceived during the second swim ( $\text{Gamma} = 0.459$ ,  $Z = 2.09$ ).



TABLE XVI

## SUMMARY OF THE PERCEPTION OF CRAMP

Experimental Conditions		Ability	Distance Swam (Widths)	Swim	Degree of Discomfort
Swim 1	Persuasion				
No Food	Hazard	S	29	2	slightly uncomf.
		S	21	2	somewhat uncomf.
		S	28	1	slightly uncomf.
		NS	* (17	1	somewhat uncomf.
			(22	2	slightly uncomf.
			21	1	somewhat uncomf.
	Control	NS	22	2	neither comf. nor uncomf.
Food	Hazard	S	23	1	very uncomf.
		S	36	2	neither comf. nor uncomf.
		NS	20	1	somewhat uncomf.
		S	40	2	somewhat comf.
	Control	S	14	1	somewhat uncomf.
		NS	(18	1	neither comf. nor uncomf.
			* (		
			(13	2	neither comf. nor uncomf.
		NS	10	1	slightly uncomf.
		NS	14	1	very uncomf.
		S	28	2	slightly comf.
		S	21	2	neither comf. nor uncomf.
	Non-hazard	NS	16	1	very uncomf.
		NS	16	1	very uncomf.
		S	* (23	1	slightly comf.
			(25	2	neither comf. nor uncomf.
		NS	15	1	slightly uncomf.





Table XVI continued -

TOTALS	No Food	6	Non-swimmers (NS)	10
	Food	14		
			Day 1	13
	Hazard	9	Day 2	10
	Control	7		
	Non-hazard	4	Uncomfortable	14
			Neither	6
	Swimmers (S)	10	Comfortable	3

\* This refers to the same subject perceiving a cramp during both swims.



## CHAPTER VI

### SUMMARY AND CONCLUSIONS

#### Summary

The purpose of this study was to ascertain the effect of the ingestion of food upon an immediate swim of a recreational nature. A secondary purpose was to determine the effect of the subject's attitude on the discomfort perceived. The attitude under consideration was the attitude toward the ingestion of food as a hazard to swimming. Based upon Thurstone's method of equal-appearing intervals an attitude scale was developed to measure this attitude in the subjects who were Grade X male physical education students in two high schools in the City of Edmonton.

Six physical education classes were selected and assigned to six separate groups. These groups were then submitted to two ten-minute swims on different days. Prior to each swim the attitude of each subject was measured on the instrument previously developed for this purpose. Following each swim the subjects indicated their perception of comfort or discomfort, and each of the other variables on a seven point continuum. Three of the groups received food consisting of three hot dogs and ten ounces of a carbonated beverage prior to the first swim, while all six groups received this





food prior to the second swim.

Four of the groups, on a day between the swims, were given information designed to change their attitude. The study was designed to accommodate six combinations involving food or no food prior to the first swim, and persuasion of two types (food is hazardous and food is non-hazardous) or no persuasion.

The data was then cross-classified and a measure of association calculated.

### Conclusions

As the subjects in this study are not truly representative of any large population the following conclusions are subject to the limitations of the methods and controls employed in this study and must be generalized with care.

1. The ingestion of a picnic-type meal did not appear to present a hazard to an immediate swim of the type studied.

2. The attitude of the subject toward food as a hazard to an immediate swim did not appear to influence the degree of discomfort perceived by the subject when the ingestion of food, as provided in this study, was followed by a ten-minute swim.

3. A tendency was observed for inexperienced swimmers to report an increase in discomfort during a swim when food was



ingested immediately prior to the swim.

4. During the second swim a tendency was observed for the subjects who were exposed to a persuasion technique to perceive comfort or discomfort which differed from the control group in the direction advocated by the persuasion phase.

5. It appears that the presentation of information dealing with the hazards or non-hazards of eating prior to swimming tended to produce a change in the subjects' attitudes toward eating as a hazard to swimming, as measured in this study, and that these changes were in the direction of the information presented.

6. The ingestion of food prior to swimming had a tendency to increase the subjects' perceptions of the length of time and distance that they swam.

7. It would appear that the subjects were confused about both the meaning of the term "cramp" and of the discomfort associated with this phenomenon.

### Recommendation

As has been noted, the sample of subjects used in this study was not statistically representative of the general public. Therefore, in order to provide definitive information, this study should be replicated utilizing a



similar design and involving a statistically representative sample of the entire population. Only when such a study is completed can any conclusions be generalized with confidence.





## BIBLIOGRAPHY



## BIBLIOGRAPHY

1. Abell, E.H. "The Effects of the Ingestion of Food Upon Swimming," Unpublished Term Paper, University of Alberta, 1966.
2. American National Red Cross, The, American Red Cross Life Saving and Water Safety, Garden City: Doubleday and Co. Ltd., 1956.
3. Armstrong, J.R., Tucker, W.E., Sports Injury, London: Staples Press, 1964.
4. Asch, S.E. Social Psychology, Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1952.
5. Bailey, H. Emergency Surgery, Briston: John Wright and Sons, 1948.
6. Bain, R. "An Attitude on Attitudinal Research," The American Journal of Sociology, 33:940-57, 1928.
7. Bell, G.H., Davidson, J.N., Scarborough, H. Textbook of Physiology and Biochemistry, Edinburgh: E. and S. Livingstone Ltd., 1961.
8. Breer, P.E. Task Experience as a Source of Attitudes, Homewood, Illinois: The Dorsey Press, 1965.
9. Canadian Red Cross Society, The Water Safety Manual of the Canadian Red Cross Society, Canada: The Hunter Rose Co. Ltd., 1964.
10. Cerney, J.V. Athletic Injuries, Springfield: Charles C. Thomas, 1963.
11. Cole, W.H., Puestow, C.B. First-Aid Diagnosis and Management, New York: Appleton, Century and Crofts Inc., 1960.
12. "Do Go Near the Water," Swimming Technique, the Journal of Swimming, Diving and Water Polo, California: Swimming World, 3:4, pp.113.
13. Dayton, W.O. Athletic Training and Conditioning, New York: The Ronald Press, 1960.





14. Edmonton Journal, Edmonton, Alberta.
15. Edwards, A.L. Techniques of Attitude Scale Construction, New York: Appleton-Century-Crofts, Inc., 1957.
16. Faris, R.L. Social Psychology, New York: The Ronald Press Co. 1952.
17. Featherstone, D.F. Sports Injuries Manual, New York: Philosophical Library, 1956.
18. Ferguson, L.W. "Two Considerations Concerning the Construction and the Use of Attitude Scales," Psychological Bulletin, 30:597, 1933.
19. \_\_\_\_\_. "The Influence of Individual Attitudes on Construction of an Attitude Scale," Journal of Social Psychology, 6:115-7, 1935
20. Fields, A. "Foot and Leg Cramps," American Practitioner and Digest of Treatment, Vol. 11, September 1960, pp. 799 - 806.
21. \_\_\_\_\_. "Leg Cramps," California Medicine: Vol. 92, July 1964, 00. 1167 - 74.
22. Floyd, W.F., Welford, A.T. Fatigue, London: H.K. Lewis and Company Ltd., 1963.
23. Forsberg, G. Modern Long Distance Swimming, London: Routledge and Kegan Paul, 1963.
24. Fulton, J.R. Muscular Contraction and the Reflex Control of Movement, Baltimore: Williams and Wilkins Co., 1926.
25. Goodman, L.A., Kruskal, W.H. "Measures of Association for Cross Classifications," Journal of the American Statistical Association, 49:732-64, 1954
26. \_\_\_\_\_. "Measures of Association For Cross Classifications," Journal of the American Statistical Association, 58:310-64, 1963.



27. Hall, Sir A.J. "Cramp and Salt Balance in Ordinary Life," Lancet, Vol. 253, August 16, 1947, p. 231.
28. Harris, C.W. (ed.) The Problems in Measuring Change, Madison: The Wisconsin Press, 1963.
29. Himmelstrand, U. Social Pressures, Attitudes and Democratic Processes, Stockholm: Almqvist and Wiksell, 1960.
30. Hinckley, E.D. "The Influence of Individual Opinion on Construction of an Attitude Scale," Journal of Social Psychology, 3:283-96, 1932.
31. Karpovich, P.V. Physiology of Muscular Activities, London: W.B. Saunders and Co., 1959.
32. Kata, D. "The Functional Approach to the Study of Attitudes," Public Opinion Quarterly, 24:163-204, 1960.
33. Krech, D., Crutchfield, R.S., and Ballachey, E.L. Individual in Society, New York: McGraw-Hill 1962.
34. Lanoue, F. "Some Facts on Swimming Cramps," Research Quarterly, Vol. 21, May 1950, pp. 153-7
35. Lindzey, Gardner, Handbook of Social Psychology, Cambridge: Addison-Wesley Publishing Co. Inc., 1954.
36. Mathews, D.K., Stacey, R.W., Hoover, G.N. Physiology of Muscular Activity and Exercise, New York: The Ronald Press Co., 1964.
37. Mauer, R.T. "Etiology and Treatment of Leg Cramps," Postgraduate Medicine, Vol. 31, July 1961, pp. 47 $\frac{1}{2}$ - 50.
38. McCatty, C. "Eating and Swimming," Journal of the Canadian Association for Health, Physical Education and Recreation, Vol. 32, No. 2, December 1965 - January 1966, p. 17.





39. Morehouse, L.E., Rasch, P.J. Scientific Basis of Athletic Training, Philadelphia: W.B. Saunders Co., 1958.
40. Newcomb, T.M. Personality and Social Change: Attitude Formation in a Student Community, New York: Dryden Press, 1943,
41. \_\_\_\_\_, Turner, R.H., Converse, P.E. Social Psychology: The Study of Human Interacting, New York: Holt, Rinehart and Winston, Inc., 1965.
42. O'Donoghue, D.H. Injuries to Athletes, London: W.B. Saunders Co., 1962.
43. Osgood, C.E., Suci, G.J., Tannanbaum, P.H., The Measurement of Meaning, Urbana, Illinois: The University of Illinois Press, 1957.
44. Pintner, R., Forlano, G. "The Influence of Attitude Upon Scaling of Attitude Items," Journal of Social Psychology, 8:39-45, 1937.
45. Remmers, H.H. Introduction to Opinion and Attitude Measurement, New York: Harper and Brothers, 1954.
46. Riedman, S.R. The Physiology of Work and Play, New York: Holt Rinehart and Winston, 1950.
47. Royal Life Saving Society Canada. The Canadian Handbook of Lifesaving Instruction, The Royal Life Saving Society Canada, 1960.
48. Royal Life Saving Society Canada. The Canadian Life Saving Manual, Toronto: The Royal Life Saving Society Canada, 1965.
49. Royal Life Saving Society United Kingdom. Illustrated Handbook of Life Saving Instructions, London: The Royal Life Saving Society, 1961.
50. Royal Life Saving Society United Kingdom. Illustrated Handbook of Life Saving Instructions, London: The Royal Life Saving Society, 1963.





51. St. John Ambulance Association. First Aid,  
Ottawa: Runge Press Ltd., 1963.
52. Scott, G.M. Analysis of Human Motion, New York:  
F.S. Crofts and Co., 1946.
53. Seashore, R.H. Henner, K. "A Time-saving Device  
for the Construction of Attitude Scales,"  
Journal of Social Psychology, 4:366-72, 1933.
54. Secord, P.F., Backman, C.W. Social Psychology,  
New York: McGraw-Hill Book Company, 1964.
55. Semotiuk, D.M. "The Attitudes Toward and Interests  
in Physical Activity of Urban Secondary  
School Students," Unpublished Master's  
thesis proposal, University of Alberta, 1966.
56. Sherif, M., Sherif, C. An Outline of Social  
Psychology, New York: Harper and Brothers,  
1956.
57. Sigerfoos, C.C. "The Validation and Application of  
a Scale of Attitude Toward any Vocation,"  
Purdue University Studies in Higher Education:  
Further Studies in Attitude Series, II,  
31: 177-91, 1936, as cited in Remmers, H.H.  
Introduction to Opinion and Attitude  
Measurement, New York: Harper and Brothers,  
1954.
58. "Splash", The Canadian Red Cross Society, Ontario  
Division, Water Safety Service, Vol. 16,  
Winter, 1966.
59. Stephenson, W. The Study of Behaviour: Q-technique  
and its Methodology, Chicago: The University  
of Chicago Press, 1953.
60. Stevens, S. "Review of Thurstone, The Measurement  
of Values," Contemporary Psychology,  
4:388-9, 1959.
61. Sweeney, Ralph E. "Oral Treatment of Skeletal  
Muscle Spasm: A Double-Bind Clinical  
Study," Current Therapeutic Research,  
Vol. 5 No. 6, January 1963, pp. 305 - 9.





62. Taber, C.W. Taber's Cyclopedic Medical Dictionary  
Philadelphia: F.A.Davis Co., 1959.
63. Thiessen, A., National Director of Water Safety,  
Canadian Red Cross Society, Personal  
Interview, Edmonton, Alberta, March 7, 1967.
64. Thomas, W.I., Znaniecki, F. The Polish Peasant:  
In Europe and America, Boston: R.G. Badger,  
1918.
65. Thorne, F.C. "Principles of Psychological Examining,"  
Journal of Clinical Psychology, pp. 392-404,  
1955.
66. Thorndike, A. Athletic Injuries, Philadelphia:  
Lea and Feniger, 1962.
67. Thurstone, L.L. "Attitudes can be Measured,"  
The American Journal of Sociology, 33:529-54,  
1928.
68. \_\_\_\_\_, "Theory of Attitude Measurement,"  
Psychological Review, 36:222-41, 1929.
69. \_\_\_\_\_, Chave, E.C. The Measurement of  
Attitude, Chicago: University of Chicago  
Press, 1929.
70. \_\_\_\_\_, "Comment" The American Journal of  
Sociology, 52: 39-50, 1946.
71. Turney, J.A. Swimming, New York: McGraw-Hill  
Book Co. Ltd., 1950.
72. U.S.A. Naval Institute, Swimming and Diving -  
The Naval Aviation P.T. Manual, Annapolis:  
U.S.A. Naval Institute, 1954.
73. Websters 3rd New International Dictionary,  
Springfield: G. and C. Merriam and Co., 1964.
74. Williams, J.G.P. Sports Medicine, London:  
Edward Arnold, 1962.
75. Woodard, C. Sports Injuries, London: Max Parish,  
1954.





APPENDIX A  
CORRESPONDENCE WITH JUDGES



10918 - 67 Avenue  
Edmonton, Alberta  
5 February, 1967

Edmonton, Alberta  
Canada

Examiners of the  
Royal Life Saving Society Canada  
Alberta Branch

Dear ;

As you may know, I am presently working toward a Masters Degree in Physical Education at the University of Alberta, and one of the requirements, of course, is a thesis. I am attempting to ascertain whether or not swimming cramps have a psychological basis. That is, how large a part does attitude play in the possibility of getting a cramp if one eats and then goes swimming? However, I need help.

I need a method of assessing the attitude of my subjects, say grade ten students. I am therefore attempting to develop an attitude scale that will measure this attitude for me. Here is where you come in. I am writing to all examiners of the Royal Life Saving Society. This is a good group to act as judges because you are interested in the problem under study, you have all had some experience with this age group around the water, you represent a good cross-section of age and experience, and most of all, you are dependable. This dependability is important as I must have the returns by Wednesday, February 15, 1967.

Would you please lend me a little of your time and act as a judge? I must point out that I am in no way attempting to measure your attitude or make any inference about you or your opinions. I am only asking you to look at a series of statements and then to indicate, to the best of your ability, what you feel this statement tells you about the person making it. That is, does this person feel that eating before swimming is dangerous or not, and to what extent. Please do not attempt to rate the statements on their accuracy or ambiguity. Ask yourself this question: "If a 15-year-old made this statement, what would I know about his attitude toward the hazard or lack of hazard of swimming after he has eaten?"



Thanks for your co-operation. I will let you know the results of this study through the newsletter.

Sincerely,

Eric H. Abell  
encl.





1. The enclosed pages contain 65 statements regarding the advisability of going swimming after eating.
2. I am going to include some of these statements in making a scale that may later be used to measure the attitude of high school students toward the hazards of eating and then going swimming.
3. As a first step in making this scale I would like a number of persons to rate these statements by assigning them to one of nine different classes.
4. We will call these classes a, b, c, d, e, f, g, h, and i, and you will find these letters directly to the left of each statement. If you find a statement which you believe expresses that a great hazard exists if one is to eat and then to swim, circle the letter "i". For a statement which seems neutral or non-committal circle "e" (the middle letter) while for those statements which express the strongest opinion that eating is not a hazard to swimming circle the letter "a". Other degrees of opinion may be indicated by circling one of the other possible letters to represent intermediate ratings.
5. Remember, this is not an attempt to measure your own attitude. You are being asked only to rate each statement on the expression it makes of the hazards or non-hazards of swimming after eating.
6. Do not try to get the same amount of statements for each letter. They are not evenly distributed.
7. The number assigned to the statement and the order of these statements is simply the result of a chance arrangement and has nothing to do with the rating of these statements.
8. You will find it easier to rate these statements if you look over a number of them chosen at random before you begin to grade.
9. If you wish to change your rating then erase the first choice and circle a new one or, if it will not erase, place an "X" over the old rating and circle a new letter.
10. When you are entirely satisfied with your rating please complete the enclosed form and return it along with all of the rated statements in the enclosed self-addressed envelope.
11. Thank you for your cooperation.



Remember the scale that you are using:

<u>a</u>	b	c	d	<u>e</u>	f	g	h	<u>i</u>
eating is most <u>certainly</u> <u>NOT</u> a hazard during an immediate swim				Neutral (non-committal)				the greatest hazard exists if one is to eat and then swim

The letters "a" and "i" represent the extreme attitude at each end of the scale. The letter "e" is neutral or non-committal. All of the other letters represent various degrees of attitude between "a" and "i".

---

As an example consider the possibility of developing an attitude scale to measure attitudes toward the church.

Statement A: I believe the churches are doing for more harm than good.

Statement B: I am attracted to the church by its courageous attack on what is commonly called impossible.

For this example "a" represents the attitude that the church is extremely good, while "i" represents the attitude that the church is extremely bad. (Remember, you are judging the statement as an expressed attitude and not whether it is true or false or whether or not you agree with it.)

Statement A: This statement certainly is on the side of the scale that notes the church is bad. It must then be "f", "g", "h", or "i". It is also a pretty strong statement denouncing the church so you might decide to give it an "h" or possibly even an "i" rating.

Statement B: This statement is pretty well on the side of the scale that sees the church as a good thing. However, it is not too strong so perhaps you would rate it as "c" or if you felt it expressed a stronger attitude toward the worthwhileness of the church you could give it a "b". It is for you to decide.





## INFORMATION ON ATTITUDE SCALE JUDGES

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Phone Number: \_\_\_\_\_

Please do not write below this line.  
  
\_\_\_\_\_

Date Received \_\_\_\_\_

Punched \_\_\_\_\_

T.Y.L. \_\_\_\_\_



- a b c d e f g h i 1. The benefits of swimming after eating rarely pay for the consequences.
- a b c d e f g h i 2. To go swimming after eating brings out the best in a person.
- a b c d e f g h i 3. There is no justification for swimming after eating.
- a b c d e f g h i 4. There are some benefits to be derived from swimming after a meal but a cramp is a big price to pay.
- a b c d e f g h i 5. There are some benefits to be derived from swimming after a meal but drowning is a big price to pay for them.
- a b c d e f g h i 6. Swimming after a meal is often the only way a person can get any exercise.
- a b c d e f g h i 7. Cramps are terrible things.
- a b c d e f g h i 8. I never think about swimming after eating and it doesn't bother me.
- a b c d e f g h i 9. I never think about cramps and they don't bother me.
- a b c d e f g h i 10. To swim after a meal will just cause a cramp and you will not really drown.
- a b c d e f g h i 11. To swim after a meal will cause a cramp.
- a b c d e f g h i 12. The desirable results of swimming after eating have not received the attention they deserve.
- a b c d e f g h i 13. To swim a little after eating is all right but some people go to far.
- a b c d e f g h i 14. Swimming anytime is wonderful.
- a b c d e f g h i 15. The possibility of getting a cramp makes swimming after eating too dangerous.



- a b c d e f g h i 16. It is good to swim after a meal if you are careful.
- a b c d e f g h i 17. It is good to swim after a meal if you do not swim alone.
- a b c d e f g h i 18. It is all right to swim after a meal if you only eat a little bit.
- a b c d e f g h i 19. It is all right to swim if you wait an hour after a meal.
- a b c d e f g h i 20. It is all right to swim after a meal if you are a good swimmer.
- a b c d e f g h i 21. Only foolish people would dare to swim after eating.
- a b c d e f g h i 22. If you want a cramp the best way to get one is to eat and then go swimming.
- a b c d e f g h i 23. It is stupid to believe that eating causes cramps.
- a b c d e f g h i 24. Even if you get a cramp it will not really hurt you.
- a b c d e f g h i 25. Swimming after eating helps you to digest your food.
- a b c d e f g h i 26. There are many good scientific reasons for not going swimming after eating and so everyone should wait at least one hour.
- a b c d e f g h i 27. It is all right to eat a little if you only swim a little.
- a b c d e f g h i 28.. It is all right to eat as much as you want and then to swim as much as you want.
- a b c d e f g h i 29. It is all right for you to swim after eating if you don't go over your head.
- a b c d e f g h i 30. Eating can cause you to get a stomach cramp if you go swimming right away.





- a b c d e f g h i 31. Anyone who gets a stomach cramp will probably drown.
- a b c d e f g h i 32. Eating an ice cream cone will not hurt anyone if they go swimming.
- a b c d e f g h i 33. Eating a bunch of hot dogs and then swimming right away will cause you to have a stomach cramp and drown.
- a b c d e f g h i 34. Most people who drown are foolish and eat before swimming.
- a b c d e f g h i 35. People who don't eat before swimming don't get cramps.
- a b c d e f g h i 36. Eating can sometimes cause cramps when swimming.
- a b c d e f g h i 37. Eating can make you sick if you go swimming.
- a b c d e f g h i 38. When I go to the beach I want to swim all the time and not wait on the shore for two hours.
- a b c d e f g h i 39. I think it is all right to swim after eating but I seldom do it.
- a b c d e f g h i 40. Too much time is wasted waiting for two hours after a meal before going swimming.
- a b c d e f g h i 41. The idea of waiting two hours before swimming is old fashioned.
- a b c d e f g h i 42. It is stupid to fight over how long you should wait after a meal before you can go swimming.
- a b c d e f g h i 43. It doesn't matter what people say. You should go swimming whenever you want to go.
- a b c d e f g h i 44. If everyone waited two hours before swimming no one would drown.



- a b c d e f g h 45. I enjoy going swimming after eating even if I might get a cramp.
- a b c d e f g h i 46. I don't think anyone should go swimming right after eating but I do it sometimes.
- a b c d e f g h i 47. I have never had a cramp so there must be no danger in swimming after a meal.
- a b c d e f g h i 48. Cramps do not hurt so it doesn't matter if you get one.
- a b c d e f g h i 49. I do not really believe that eating causes swimming cramps.
- a b c d e f g h i 50. I believe that eating really does cause swimming cramps.
- a b c d e f g h i 51. I believe that if you never take chances by swimming after eating you will have a much better time.
- a b c d e f g h i 52. To go swimming after I eat makes me feel good.
- a b c d e f g h i 53. To go swimming after I eat makes me feel sick but I do not get a cramp.
- a b c d e f g h i 54. To me, going swimming is more important than worrying about a cramp.
- a b c d e f g h i 55. To eat and then go swimming is very dangerous.
- a b c d e f g h i 56. I don't care if I do get a cramp.
- a b c d e f g h i 57. I do not think anyone should swim unless they wait at least an hour after eating.
- a b c d e f g h i 58. I see no value in swimming after eating.





a b c d e f g h i

59. I see no value in waiting an hour before going swimming.

a b c d e f g h i

60. I do not know of any scientific reasons for swimming after eating so I don't care to do it.

a b c d e f g h i

61. I don't think swimming after a meal will do anyone any harm.

a b c d e f g h i

62. To swim after a meal is very restful.

a b c d e f g h i

63. I do not like to swim after eating but it is fine for other people to do it.

a b c d e f g h i

64. To eat before swimming enables a person to swim his very best.

a b c d e f g h i

65. Under some conditions you may have to go swimming after eating.



## REMINDER TO ALL ATTITUDE SCALE JUDGES

E.H. Abell,  
10918 - 67 Avenue  
Edmonton, Alberta

13 February 1967

Dear

Today is February the 13th. A few days ago you received a request to help me with an attitude scale by acting as a judge.

I must impress upon you the urgency of this request. I am trying to meet a deadline and in order to do this I must have your reply by February 15, 1967.

Our Society is made up of competent, conscientious people and I am counting on a return of almost 100 %. Your careful consideration and return of these statements will most certainly be appreciated.

If you have not yet done so would you please return the material as soon as you are able to find the time to give it your consideration. If you have already returned the attitude scale -- Many thanks.

Sincerely,

Eric H. Abell



E.H. Abell  
10918 - 67 Avenue  
Edmonton, Alberta

(Date)

(Greetings)

I have recently received your reply to my request for help with an attitude scale. Thank you for providing me with your judgements which will be an important part of my study.

If you will watch the Newsletter I will try to let you know of the results of this study sometime during the coming summer.

It is indeed noteworthy that the examiners of our branch have responded so quickly and effectively to this request. Certainly this efficiency says a great deal for the Royal Life Saving Society and its members.

MANY THANKS.

Sincerely,

Eric H. Abell





APPENDIX B  
SUBJECT INFORMATION



BEFORE SWIM  
QUESTIONNAIRE

Name \_\_\_\_\_

Block \_\_\_\_\_ Class # \_\_\_\_\_

Please read each statement carefully and indicate whether you agree (A) or disagree (D) with the statement by circling the appropriate letter.

AGREE    DISAGREE

- |   |   |   |
|---|---|---|
| A | D | 1. The possibility of getting a cramp makes swimming after eating too dangerous.                              |
| A | D | 2. I do not think anyone should swim unless they wait an hour after eating.                                   |
| A | D | 3. I don't think swimming after a meal will do anyone any harm.   |
| A | D | 4. Most people who drown are foolish and eat before swimming.   |
| A | D | 5. I do not really believe that eating causes swimming cramps.  |
| A | D | 6. It is all right to eat as much as you want and then to swim as much as you want.                           |
| A | D | 7. The benefits of swimming after eating rarely pay for the consequences.                                     |
| A | D | 8. I have never had a cramp so there must be no danger in swimming after a meal.                              |
| A | D | 9. The idea of waiting two hours before swimming is old fashioned.  |
| A | D | 10. Too much time is wasted waiting for two hours after a meal before going swimming.                         |
| A | D | 11. I believe that eating really does cause swimming cramps.  |
| A | D | 12. The desirable results of swimming after eating have not received the attention they deserve.              |
| A | D | 13. I believe that if you never take chances by swimming after eating you will have a much better time.       |
| A | D | 14. Eating can sometimes cause cramps when swimming,  |
| A | D | 15. To eat before swimming enables a person to swim his very best.  |
| A | D | 16. Eating can make you sick if you go swimming.  |
| A | D | 17. Only foolish people would dare to swim after eating.  |
| A | D | 18. Eating a bunch of hot dogs and then swimming right away will cause you to have a stomach cramp and drown. |
| A | D | 19. Swimming after eating helps you to digest your food.  |
| A | D | 20. To swim after a meal is very restful.   |





## SUBJECT INFORMATION

- Please Print -

Name \_\_\_\_\_ School \_\_\_\_\_  
Age \_\_\_\_\_ Block \_\_\_\_\_ Class # \_\_\_\_\_  
Height \_\_\_\_\_ Weight \_\_\_\_\_

How often did you swim during the past month?

\_\_\_\_\_ Never  
\_\_\_\_\_ 1 - 5 times  
\_\_\_\_\_ 6 - 15 times  
\_\_\_\_\_ 15 or more times

How many consecutive widths of the pool can you swim without any rest and without touching the bottom?

\_\_\_\_\_ less than 1 width  
\_\_\_\_\_ from 1 to 2 widths  
\_\_\_\_\_ more than 2 but less  
\_\_\_\_\_ than 10 widths  
\_\_\_\_\_ 10 or more widths



Block	Class#
-------	--------

- Additional Comments:



# APPENDIX C

The following is a list of the names of the persons who have been appointed to the various committees of the Board of Directors of the Corporation. The names are listed in alphabetical order of the last name. The names of the persons who have been appointed to the various committees of the Board of Directors of the Corporation are listed in alphabetical order of the last name.

## APPENDIX C

### GAMMA AS A MEASURE OF ASSOCIATION

The following is a list of the names of the persons who have been appointed to the various committees of the Board of Directors of the Corporation. The names are listed in alphabetical order of the last name. The names of the persons who have been appointed to the various committees of the Board of Directors of the Corporation are listed in alphabetical order of the last name.





### Gamma as a Measure of Association

As developed by Goodman and Kruskal (25)(26) the statistic Gamma is a probabilistic measure that is not dependent upon underlying continua in the variables to be cross-classified. Gamma makes no assumption as to the intervals of the variables, rather, it is concerned with the order in which the variables appear, and a necessary assumption is that both cross-classification characteristics have an intrinsic order.

Goodman and Kruskal give the computational formula for Gamma as .

$$\text{Gamma} = \frac{\text{probability of similar order} - \text{probability of unlike order}}{\text{probability of a tie in order}}$$

As calculated above (i) Gamma is indeterminate if the population lies in a single row or column in the table. (ii) Gamma = 1 if the population is concentrated in the diagonal. Depending upon the slope of the diagonal Gamma may have a value ranging from -1 to +1. (iii) Gamma = 0 in the case of independence, but the converse does not necessarily hold, except in the case of a 2 x 2 table.





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